Contents

5 - Lexium SD3 motion control

Product offer

- Presentation . . . . . page 5/2

SD326 stepper motor drives

- Description . . . . . page 5/4
- Schemes . . . . . page 5/5
- Functions . . . . . page 5/6
- Characteristics . . . . . page 5/12
- References . . . . . page 5/14
- Dimensions . . . . . page 5/15
- Mounting and installation recommendations . . . . . page 5/36

SD328 stepper motor drives

- Description . . . . . page 5/16
- Schemes . . . . . page 5/18
- Functions . . . . . page 5/21
- Characteristics . . . . . page 5/30
- References . . . . . page 5/34
- Dimensions . . . . . page 5/35
- Mounting and installation recommendations . . . . . page 5/36

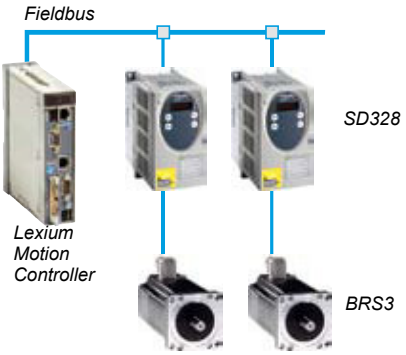
BRS3 3-phase stepper motors

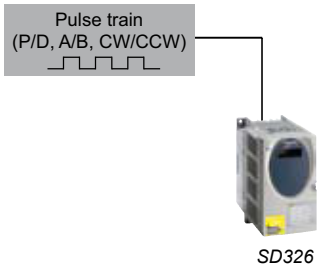
- Presentation, description . . . . . page 5/40
- Characteristics . . . . . page 5/42
- References . . . . . page 5/44
- Dimensions . . . . . page 5/46
- Options
  - Holding brake . . . . . page 5/50
  - Encoder . . . . . page 5/51

Options and accessories

- For stepper motor drives SD3
  - Integrated and optional EMC filters . . . . . page 5/53
  - Mounting plate . . . . . page 5/60
  - Planetary gearboxes GBX . . . . . page 5/63
  - Options and accessories: overview . . . . . page 5/67
- For stepper motor drives SD326
  - Signal interface . . . . . page 5/57
- For stepper motor drives SD328
  - Pulse/direction interface . . . . . page 5/56
  - Remote display terminal . . . . . page 5/58
  - “Lexium CT” commissioning software . . . . . page 5/59
  - Reference value adapter (RVA) . . . . . page 5/61
  - RS 422 interface adapter (USIC) . . . . . page 5/62
- For stepper motor drives SD328A
  - CANopen machine bus . . . . . page 5/54
  - Modbus serial bus . . . . . page 5/55

Lexium SD3 motion control
Lexium stepper motor drives





Product offer

A Schneider Electric stepper motor drive system comprises of an SD3 stepper motor drive and a BRS3 3-phase stepper motor.
Reference values are set and, if applicable, monitored by a master PLC or a Schneider Electric Motion Controller (e.g. Lexium Motion Controller).
Together with Schneider Electric BRS3 stepper motors, SD3 is a very compact, high-performance drive system.

Compactness

With its small dimensions (H x W x D: 145 mm x 72 mm x 140 mm), the SD3 stepper motor drive requires very little space in the control cabinet.

Simplicity

Simple cabling and parameterisation of the SD326 allow for easy and quick commissioning. Commissioning software is not required.
The SD328 drives are convenient to configure via the integrated control panel (HMI), via fieldbus or with the Lexium CT PC commissioning software.

Flexibility

SD3 stepper motor drives are available in two power classes: 2.5 A and 6.8 A. The SD3 stepper motor drives are delivered with the following components depending on the device type:

- An opto-isolated signal interface for 5 V and 24 V input signals (SD326)
- An RS422 interface for pulse/direction signals or A/B encoder signals (SD328)
- A fieldbus interface for SD328: CANopen and Modbus (SD328A) or PROFIBUS DP (SD328B):
  The CANopen interface of the SD328A can be used for connection to a CANopen AutomationBus or a CANopen MotionBus.
  Movements of up to eight drive axes can be synchronously controlled by one Motion Controller (e.g. Lexium Motion Controller) via the CANopen MotionBus.
- Analogue reference value input ±10 V (SD328)
- A power supply unit for single-phase mains voltages of 115 V~ and 230 V~
- Integrated mains filter

The SD326 can optionally be shipped with an electronic system for rotation monitoring and brake control.

Application areas

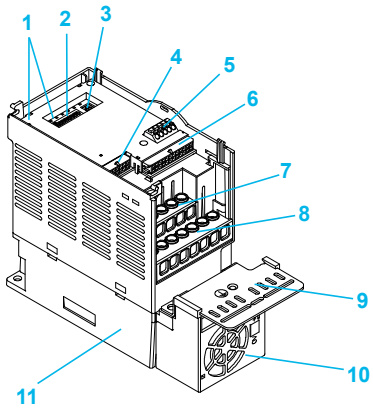
A stepper motor drive system from Schneider Motion has excellent constant velocity characteristics, which are required for applications such as scanning or exposure.
Due to the high torque at low speeds of rotation, the SD3 stepper drive system is particularly suited for short-distance positioning.
Another advantage is its high holding torque at standstill. This allows for the highly economic implementation of automation tasks such as "pick and place".

Assignment of BRS3 3-phase stepper motors and SD3 stepper motor drives

BRS3 3-phase stepper motors	SD326•U25 SD328•U25	SD326•U68 SD328•U68
	115 V / 230 V; 2.5 A; including mains filter	115 V / 230 V; 6.8 A; including mains filter and fan
BRS368	1.7 Nm / 1.5 Nm *(1)*	
BRS397	2.3 Nm / 2.0 Nm	
BRS39A	4.5 Nm / 4.0 Nm	
BRS39B	6.8 Nm / 6.0 Nm	
BRS3AC		13.5 Nm / 12.0 Nm
BRS3AD		19.7 Nm / 16.5 Nm

(1) The 1st value is the holding torque M_H when the stepper motor is at a standstill, the 2nd value is the nominal torque M_N when the motor is in operation.

Lexium SD3 motion control
SD326 stepper motor drives



Description

1 LED for status display
2 Parameter switch for configuration of the stepper motor drive
3 Rotary switch for adjustment of the motor current
4 CN2 rotation monitoring (12-pole socket, optional)
5 24 V CN3 interface (spring terminals, optional)
- 24 V controller supply voltage
- 24 V outputs (holding brake and encoder errors)

6 CN1 signal interface (24-pole socket)
- 5 V inputs, opto-isolated
- 24 V inputs, opto-isolated
- Output Readiness

7 Screw terminals for connecting the mains supply
8 Screw terminals for connecting the motor
9 EMC mounting plate (included)
10 Fan (included with SD326●U68)
11 Heat sink

Drive system

The SD326 is a universally applicable stepper motor drive. Reference values are typically preset and monitored by a master PLC or a motion controller. Together with selected Schneider Electric stepper motors, SD326 is a very compact, high-performance drive system.

Control

The reference value is supplied incrementally as a pulse signal via the signal interface. Control signals are also sent to enable the power amplifier and to change the step resolution and the current reference value. An output signal reports operating readiness.

Rotation monitoring / motor monitoring (option)

If a stepper motor with integrated encoder is connected, the following functions can be activated:

- Rotation monitoring
  The calculated reference position and the actual position of the motor are compared. If a defined deviation is exceeded, a rotation monitoring error is signalled.
- Line monitoring
  The encoder cable is monitored by a line monitoring system. A cable error is signalled if a defective or missing cable is detected.
- Motor temperature monitoring
  The stepper motor drive shuts off if the temperature is too high.

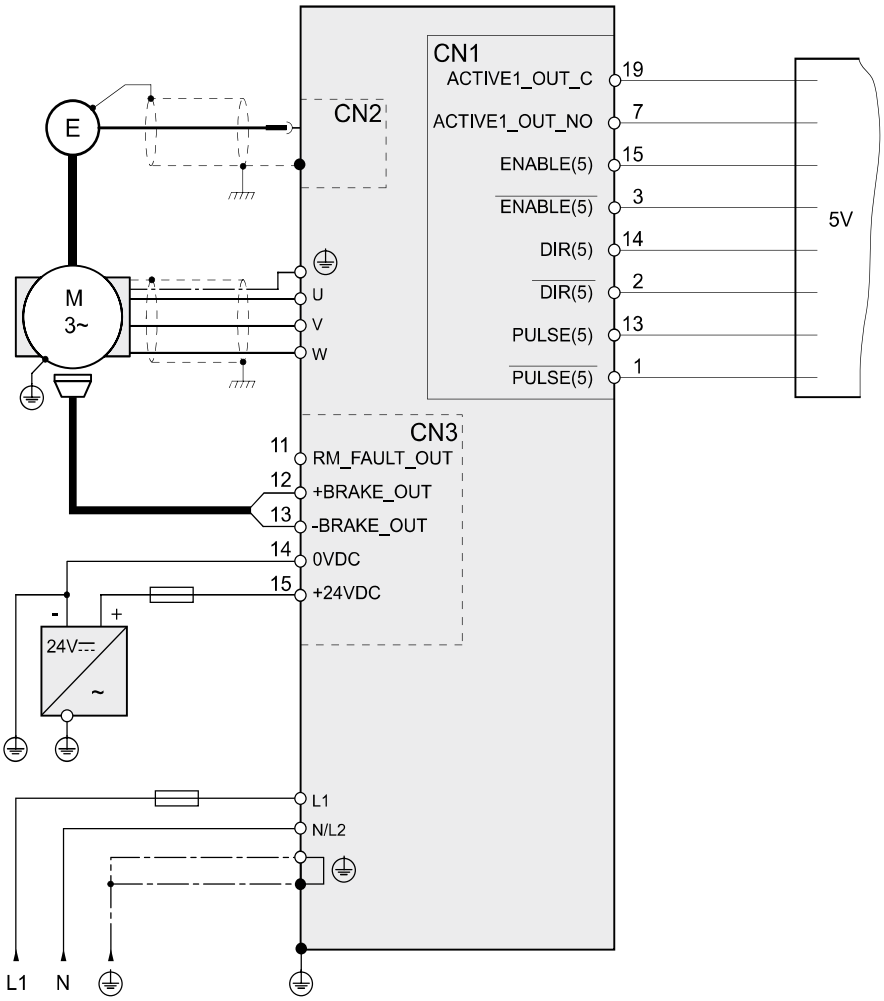
Rotation monitoring is an optional feature of the SD326 stepper motor drive. The controller supply voltage (+24 V⎓) must be connected if rotation monitoring is used.

Holding brake output (option)

The SD326 stepper motor drive has an output for direct connection of an optional holding brake. The controller supply voltage (+24 V⎓) must be connected if a holding brake is used.

Schemes

SD326 connection example

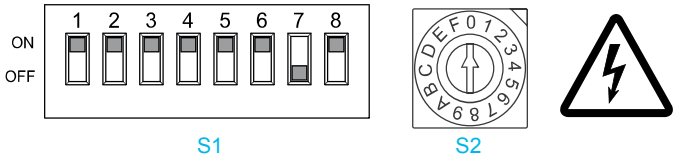


Functions

Parameterisation

The following functions can be activated via the parameter switch of the SD326:

- ■ Motor phase current
- ■ Number of steps
- ■ Current reduction during standstill
- ■ SOFTSTEP
- ■ Rotation monitoring (only for device version SD236R with rotation monitoring)
- ■ Function of signal inputs
- □ ENABLE / GATE
- □ PULSE / DIR or CW / CCW



Parameter switches

Setting motor phase current

The motor phase current is set with rotary switch S2. The motor phase current should not exceed the nominal current of the motor, because the motor may otherwise overheat. A low motor phase current produces a low torque.

Settings with rotary switch

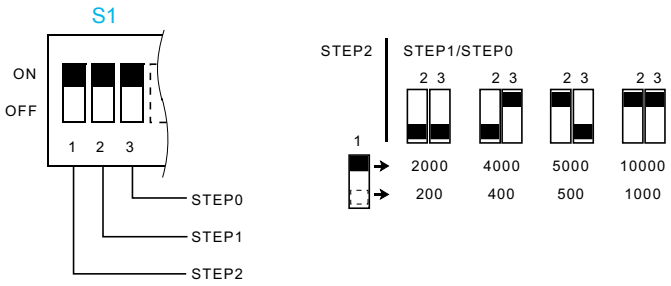
Switch position S2	Motor phase current [A]	
	SD326●U25	SD326●U68
0 (factory setting)	0.6	1.7
1	0.8	2.0
2	0.9	2.4
3	1.0	2.7
4	1.1	3.1
5	1.3	3.4
6	1.4	3.7
7	1.5	4.1
8	1.6	4.4
9	1.8	4.8
A	1.9	5.1
B	2.0	5.4
C	2.1	5.8
D	2.3	6.1
E	2.4	6.5
F	2.5	6.8

Setting number of steps

The resolution of the stepper motor drive system is set via the number of steps.

Example
At a number of steps of 1000 and at 1000 pulses, the stepper motor drive turns the motor exactly one complete revolution. At a pulse frequency of 1 kHz this results in a speed of rotation of 60 rpm.

Settings via parameter switch
Number of steps: 200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000 per revolution.



Setting the number of steps

Activating motor phase current reduction at standstill

If the full holding torque is not required at standstill, the “motor phase current reduction” function can be used to reduce the holding torque. Motor and electronics heat up less and the efficiency is improved.
The motor phase current is reduced to approximately 60% of the set current value 100 ms after the last pulse edge is received.

Settings via parameter switch
Activate/deactivate motor phase current reduction.

Activating the “Softstep” function

If the Softstep function is activated, the reference value is internally set to a higher resolution. The motor then runs much more smoothly, in particular at low speeds or sudden changes in the reference value.
The motor accelerates and decelerates virtually without jerking. The transitions are smoothed, i.e. the motor can follow the reference values much more easily with fast changes of frequency.

Settings via parameter switch
Activate/deactivate “Softstep” function

Activating the rotation monitoring function (only for SD326R with rotation monitoring)

The calculated reference position and the actual position of the motor are compared for rotation monitoring. If a defined deviation is exceeded, a rotation monitoring error is signalled.
For rotation monitoring, the stepper motor must be equipped with electronics for rotation monitoring and the stepper motor must have an encoder with a resolution of 1000 increments/rotation.

Settings via parameter switch
Activate/deactivate “Rotation monitoring” function

Signal inputs

All signal inputs are available as 5 V or 24 V optocoupler signal inputs.

Reference value setting via the PULSE/DIR or CW/CCW signal input

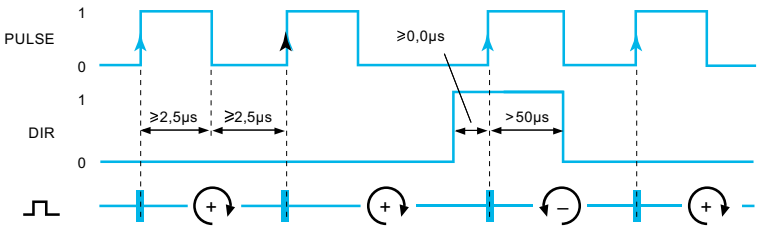
The reference value can alternatively be set via one of the two following interface modes:

- PULSE/DIR
- CW/CCW

The maximum pulse frequency is 200 kHz.

PULSE/DIR interface mode

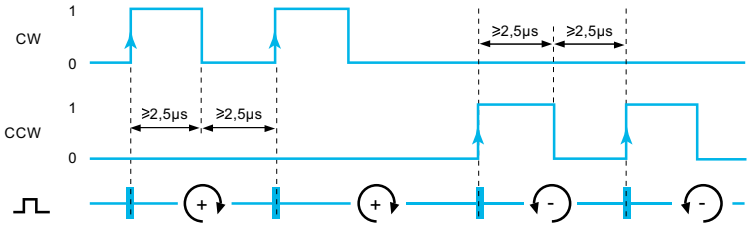
The motor executes an angler step with the rising edge of the PULSE signal. The direction of rotation is controlled by the DIR signal.



PULSE/DIR interface mode

Interface mode CW/CCW

The motor executes a clockwise angle step with the rising edge of the CW signal. The motor executes a counterclockwise angular step with the rising edge of the CCW signal.



Interface mode CW/CCW

Settings via parameter switches

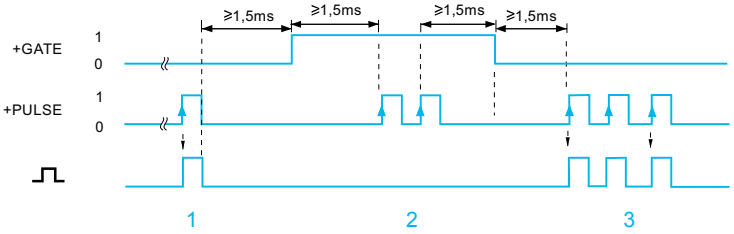
Setting the function of the PULSE/DIR or CW/CCW signal input.

Setting the function of the ENABLE/GATE signal input

The ENABLE/GATE signal input can have two functions:

ENABLE function: enable/disable power amplifier
The ENABLE function enables the power amplifier to allow control of the motor.

GATE function: enable/disable the pulse input
The GATE function blocks the pulses of the reference value input without disabling the operating readiness. In a multi-axis system, individual axes can be selected with the GATE function.



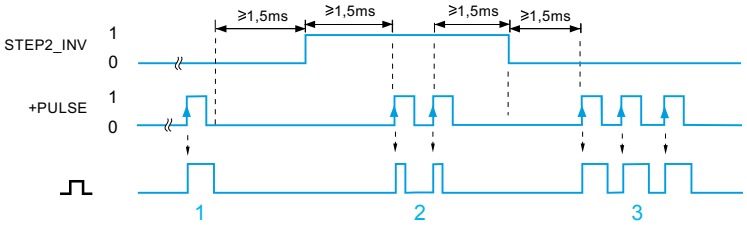
Signal sequences in case of activation via the GATE function

1 Motor step
2 No motor steps
3 Motor steps

Settings via parameter switch
Setting the function of the ENABLE/GATE signal input

Changing the number of steps with the STEP2_INV signal input

The STEP2_INV signal input can be used if a high positioning accuracy is required, but the output frequency of the master controller is limited.
The number of steps can be increased or reduced by a factor of 10 with the STEP2_INV signal.



Signal sequences when the STEP2_INV signal changes

1 Large motor step
2 Number of motor steps reduced by a factor of 10
3 Large motor steps

Controlling the motor phase current via the PWM signal input

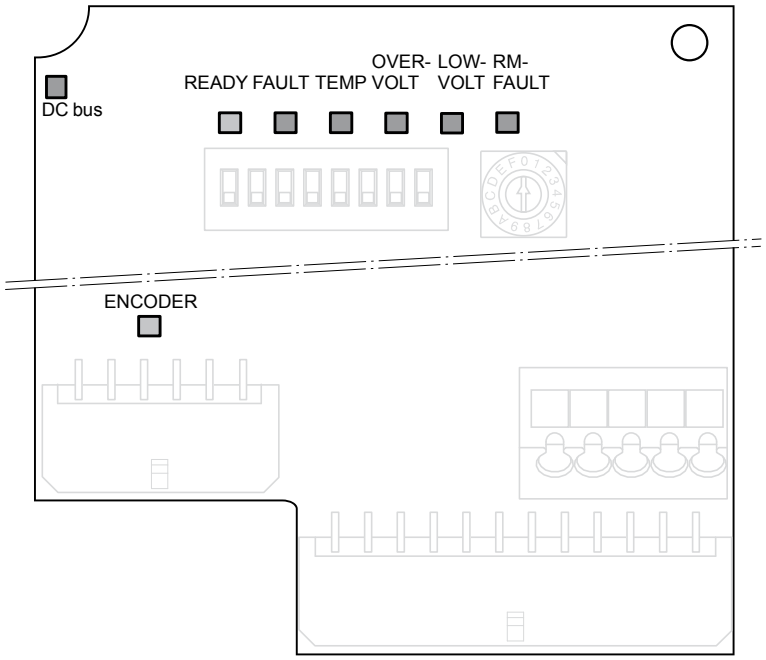
The motor phase current can be changed between 0 % and 100 % of the maximum current set with the rotary switch by means of the pulse/pause ratio of a rectangular signal at the signal input “PWM” (PWM: pulse width modulation). The frequency of the rectangular signal must be between 6 kHz and 25 kHz.
No motor phase current flows at constant 1-level (current set to zero).
The motor operates at the specified maximum motor phase current at constant 0-level.

Signal outputs

The following signal outputs are available:
- Electronic ACTIVE_OUT relay contact to signal operating readiness
- 24 V signal output +BRAKE_OUT to control a motor holding brake (optional, only for SD326R)
- 24 V signal output RM-FAULT_OUT to signal an error during rotation monitoring (optional, only for SD326R)

Status indication

The LEDs indicate the current operating status.



Status indication

LED	Description
READY	Ready, power amplifier enabled, motor with current (1-level at ENABLE input signal)
FAULT	Short circuit between two motor phases or between motor phase and PE (ground)
TEMP (static)	Power amplifier overtemperature
TEMP (flashing) *(1)*	Motor overtemperature
OVER-VOLT	Overvoltage (> 410 V)
LOW-VOLT	Undervoltage (< 200 V)
RM-FAULT *(1)*	Error signal from rotation monitoring
OVER-VOLT, LOW-VOLT	Power amplifier disabled, motor without current
FAULT, TEMP, OVER-VOLT, LOW-VOLT	Frequency at signal interface too high

(1) SD326R only

Lexium SD3 motion control
SD326 stepper motor drives

Certifications				
Conformity to standards			Lexium Stepper Motor Drive SD3 have been developed to conform to the strictest international standards and with the recommendations for electronic control systems in the industry, specifically: low-voltage switchgear, IEC/EN 61800-5-1, IEC/EN 50178, IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals).	
	EMC immunity		IEC/EN 61800-3, environments 1 and 2; IEC/EN 61000-4-2 level 3; IEC/EN 61000-4-3 level 3; IEC/EN 61000-4-4 level 4; IEC/EN 61000-4-5 level 3;	
	Conducted and radiated EMC emissions		IEC/EN 61800-3, environments 1 and 2, categories C2, C3 ■ Devices without external mains filter: □ C3 up to 10 m motor cable length ■ Devices without external mains filter: □ C2 up to 20 m motor cable length □ C3 up to 50 m motor cable length	
CE marking			The drives are CE marked in accordance with the European low voltage (2006/95/EC) and EMC (89/336/EEC) directives.	
Product certification			UL (USA), cUL (Canada)	
Ambient conditions				
Operating temperature *(1)*		**°C**	0 ... +50	
Operating temperature when used in accordance with UL *(1)*		**°C**	0 ... +40	
Transport and storage temperature		**°C**	-25 ... +70	
Pollution degree			Level 2	
Relative humidity		**%**	5 ... 85%, no condensation allowed	
Max. installation height over m.s.l. without power loss		**m**	< 1000	
		m	< 2000 at max. ambient temperature 40°C, no protective film and a lateral distance of > 50mm	
Vibration test as per IEC/EN 60068-2-6			3 ... 13 Hz: 1.5 mm peak	
			13 ... 150 Hz: 1 gn	
Shock test as per IEC/EN 60068-2-27			15 gn for 11 ms	
Degree of protection			IP 20	
			IP 40 restricted: only from above without removal of protective film.	
Electrical data				
Mains supply			**SD326●U25**	**SD326●U28**
Nominal voltage (switchable)		**V**	115 / 230 (1~)	
Max. nominal motor current		**A**	2.5	6.8
Nominal power (115 V / 230 V)		**W**	180 / 270	280 / 420
Max. permissible short circuit current of mains		**kA**	0.5	0.5
Fuse to be connected upstream (115V/230V)		**A**	6 / 6	10 / 6
Voltage range and tolerance	115 V~	**V**	100 - 15 % ... 120 + 10 %	
	230 V~	**V**	200 - 15 % ... 240 + 10 %	
Frequency		**Hz**	47 ... 63	
Transient overvoltages			Overvoltage category III	
Inrush current		**A**	< 60	
Leakage current (as per IEC 60990-3)		**mA**	< 30	
Signal interface (CN1)				
5 V optocoupler input signals				
Logic 1 (U_{high})		**V**	+2.5...+5.25	
Logic 0 (U_{low})		**V**	≤ 0.5	
Input current		**mA**	≤ 25	
Max. input frequency		**kHz**	≤ 200	
24 V optocoupler input signals				
Logic 1 (U_{high})		**V**	+15 ... +30	
Logic 0 (U_{low})		**V**	≤ 5	
Input current		**mA**	≤ 7	
Max. input frequency		**kHz**	≤ 200	
"Readiness" signal output			Electronic relay	
Max. switching voltage		**⎓V**	≤ 30	
Max. switching current		**mA**	≤ 200	
Voltage drop at 50 mA load		**V**	≤ 1	
Rotation monitoring interface (CN2, option)				
ENC_A/ENC_B signal input				
Voltage symmetrical		**V**	As per RS 422	
Input frequency		**kHz**	≤ 400	
ENC+5V_OUT signal output			Sense-controlled, short-circuit-proof, overload-proof	
Supply voltage		**V**	4.75 ... 5.25	
Max. output current		**mA**	≤ 100	
Voltage drop at 50 mA load		**V**	≤ 1	

(1) No icing

Electrical data (continued)			
24 V interface (CN3, option)			
24 V control voltage		As per IEC 61131-2	
Input voltage	**V**	24 -15% / +20%	
Current consumption	**A**	≤ 0.2	
Residual ripple	**%**	≤ 5	
24 V output signals		As per IEC 61131-2	
Output voltage	**V**	≤ 30	
Max. Switching current RM-FAULT_OUT	**V**	≤ 50	
Max. switching current +BRAKE_OUT	**A**	≤ 1.7	
Voltage drop at 50 mA load	**V**	≤ 1	
Mechanical data			
		SD326●U25	**SD326●U28**
Dimensions (W x H x D)	**mm**	72 x 145 x 140	
Mass	**kg**	1.1	1.2
Type of cooling		Convection	Fan
Max. speed of rotation of motor	**rpm**	3000	

Lexium SD3 motion control
SD326 stepper motor drives

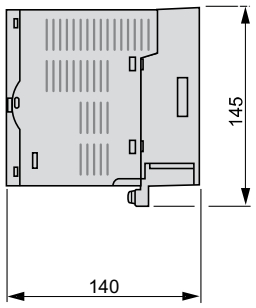
SD326 stepper motor drive

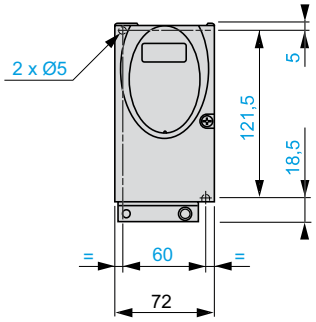
References

Example:	SD3	26	D	U25	S2
Product designation **SD3** = stepper motor drive 3-phase	**SD3**	26	D	U25	S2
Product type **26** = standard stepper motor drive	SD3	**26**	D	U25	S2
Interfaces **D** = pulse/direction without rotation monitoring **R** = pulse/direction with rotation monitoring and holding brake connection	SD3	26	**D**	U25	S2
Max. nominal motor current **U25** = 2.5A **U68** = 6.8A	SD3	26	D	**U25**	S2
Power amplifier supply voltage **S2** = 1~, 115 V~ / 230 V~ (switchable)	SD3	26	D	U25	**S2**

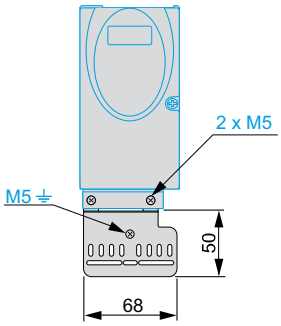
Dimensions

SD326, dimensions in mm



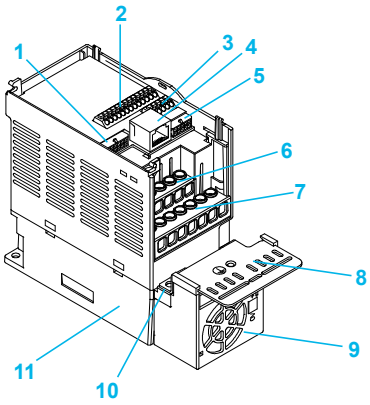


EMC mounting plate (included)



5

Lexium SD3 motion control
SD328 stepper motor drives



Description

Components and interfaces

1 12-pole socket CN2 for motor encoder
2 I/O signal connection CN1 (spring terminals)
- Analogue reference value input ±10 V in oscillator operating mode (SD328A only)
- CANopen for fieldbus control (SD328A only)
- PROFIBUS DP for fieldbus control (SD328B only)
- Eight digital inputs/outputs. The assignment depends on the selected operating mode.

3 Connection CN3 for 24 V power supply and holding brake
4 RJ45 socket CN4 for connection of:
- Fieldbus: Modbus or CANopen (SD328A only)
- PC with Lexium CT commissioning software
- Remote terminal

5 10-pole socket CN5 for input of pulse/direction or A/B encoder signals in "electronic gear" operating mode
6 Screw terminals for connecting the mains supply
7 Screw terminals for connecting the motor and external braking resistors
8 EMC mounting plate
9 Fan (SD328●U68 only)
10 Base for fastening of the EMC mounting plate
11 Heat sink

Drive system

The SD328 is a universally applicable stepper motor drive.
Reference values are typically preset and monitored by a master PLC or a Schneider Electric Motion Controller, e.g. LMC.
Together with selected Schneider Electric stepper motors, the unit is a very compact, high-performance drive system.

Control

Reference values are supplied via:
- CANopen, Modbus (SD328A) or PROFIBUS DP (SD328B):
  The CANopen interface of the SD328A can be used for connection of a CANopen AutomationBus or CANopen MotionBus.
  Movements of up to eight drive axes can be synchronously controlled by one Motion Controller (e.g. Lexium Motion Controller) via the CANopen MotionBus.
- ±10 V analogue signals for "Oscillator" operating mode (SD328A)
- Pulse/direction signals or A/B encoder signals for implementing an electronic gear

Rotation monitoring / motor monitoring

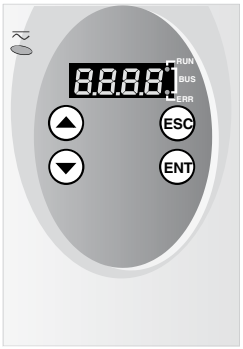
If a stepper motor with integrated encoder is connected to the stepper motor drive, the following functions can be activated:
- Rotation monitoring
  The calculated reference position and the actual position of the motor are compared. If a defined deviation is exceeded, a rotation monitoring error is signalled.
- Line monitoring:
  A cable error is signalled if a defective or missing cable is detected.
- Motor temperature monitoring:
  The device shuts off if the motor temperature is too high.

Holding brake output

The stepper motor drive has an output for direct connection of an optional holding brake.

"Safe Torque Off" safety function (Power Removal "PWRR")

The integrated "Safe Torque Off" safety function enables a category 0 or 1 stop as per IEC/EN 60204-1 without external power contactors. The supply voltage does not have to be interrupted. This reduces the system costs and response times.
The drive system fulfils the requirements of IEC/EN 61508 SIL2 as well as of ISO 13849-1, performance level "d" (PL d), and IEC/EN 61800-5-2 ("STO").



Integrated control panel (HMI)

Remote terminal

Lexium CT PC commissioning software

Local communication

Overview

The SD328 stepper motor drive can be operated locally as follows:
- Integrated control panel (HMI - Human Machine Interface) an the SD328 with keys and display
- Remote terminal
- Lexium CT PC commissioning software

Integrated control panel (HMI)

The integrated control panel (HMI) allows the user to edit parameters. It is also possible to display the results of diagnostics functions.
Among other things, the integrated control panel (HMI) provides the following features:
- Initial settings:
  - Motor selection
  - Fieldbus address and baud rate
  - Logic type of digital inputs and outputs (SD328A only)
- Device settings:
  - Special ratios
  - Phase current components for standstill, acceleration and constant movement
- Device configuration
  - Processing the motor encoder position
  - Signal selection at position interface
  - Definition of direction of rotation
  - Time delay for releasing and applying the holding brake
- Jog motor manually
- Error display
- Status information:
  - Status of digital inputs and outputs
  - Actual speed of rotation and actual position of the motor
  - DC bus voltage of power amplifier supply voltage
  - Temperature of stepper motor drive and motor
  - Saved warnings and monitoring signals
  - Operating hours counter

Remote terminal

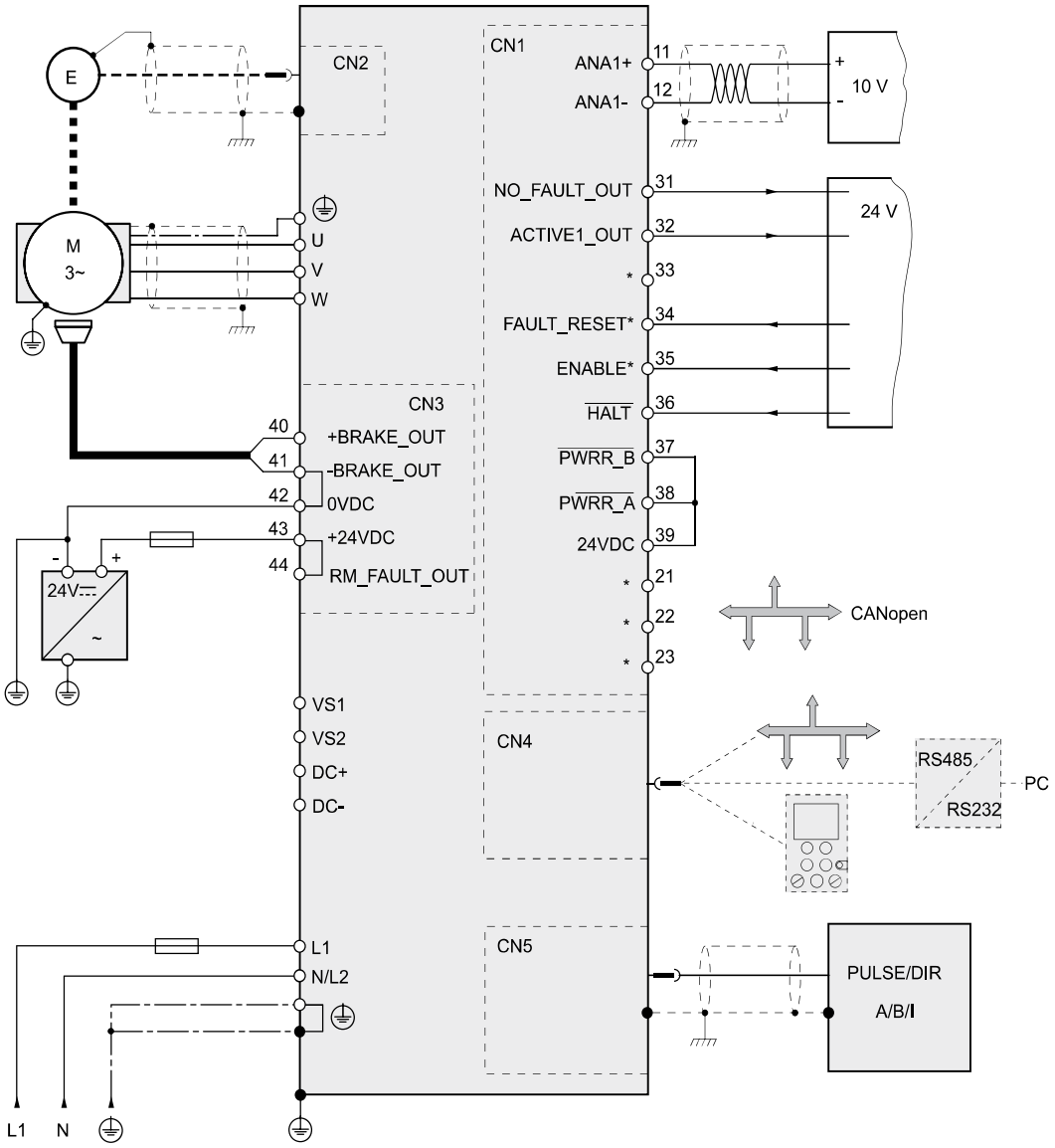
A remote terminal can be connected to the SD328 stepper motor drive, which can be mounted to a control cabinet door with a seal with IP 65 degree of protection.
The remote terminal has a display and enables access to the same functions as the control panel (HMI) integrated into the stepper motor drive.

Lexium CT PC commissioning software

The Windows-based Lexium CT PC commissioning software is used for easy commissioning, parameterisation, simulation and diagnostics of the SD328 stepper motor drive.
The Lexium CT PC commissioning software allows the user to load and save controller parameters and motor data.
As compared to the integrated control panel (HMI), the Lexium CT PC commissioning software offers additional features such as:
- Graphical user interface for parameterisation and status display
- Comprehensive diagnostics tools for optimisation and maintenance
- Long-term recording as an aid to assessing operational behaviour
- Testing input and output signals
- Tracking signal sequences on the monitor
- Archiving of all device settings and recordings (with export functions for data processing).

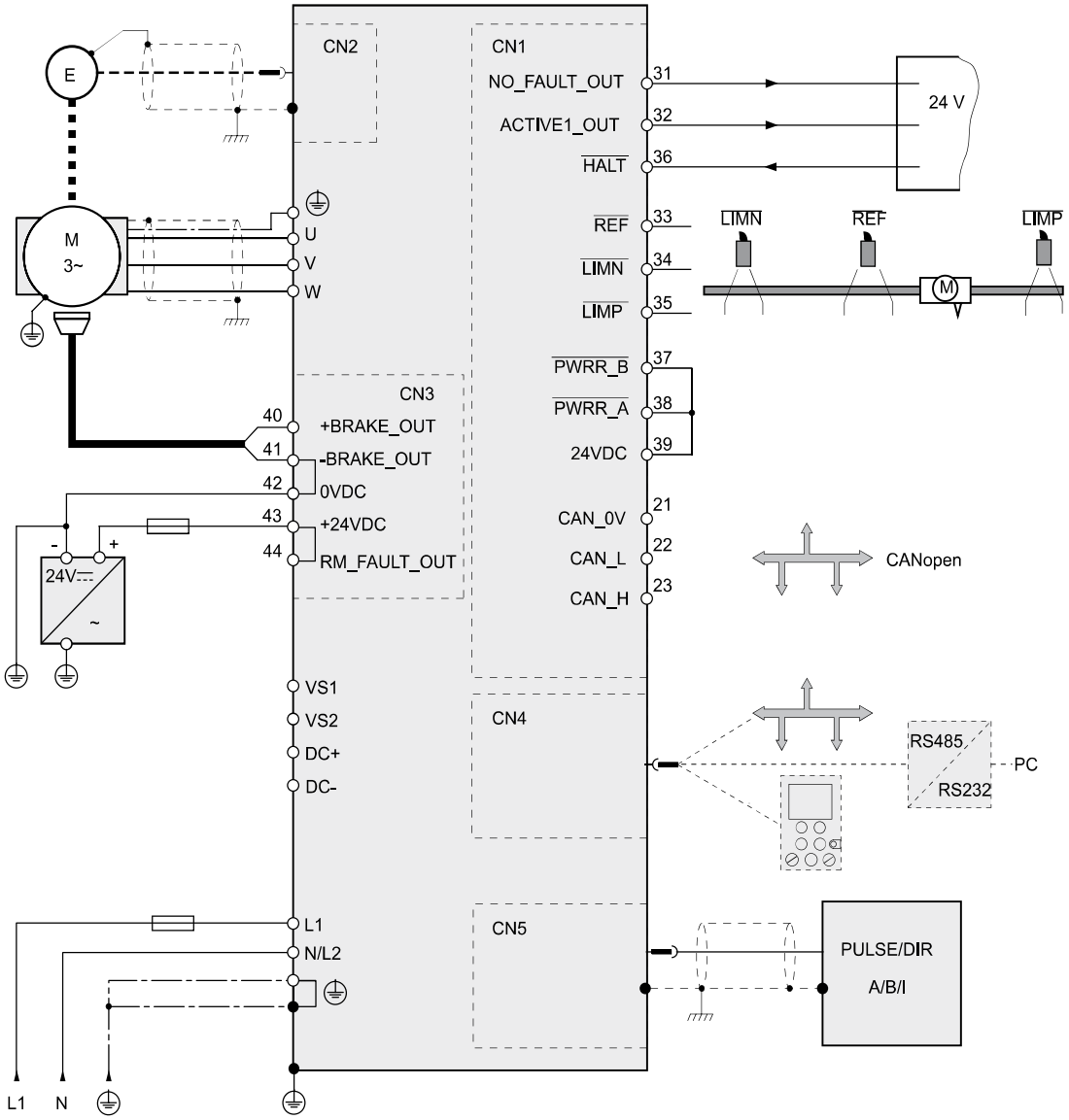
Lexium SD3 motion control
SD328 stepper motor drives

Schemes
SD328A connection example with local control



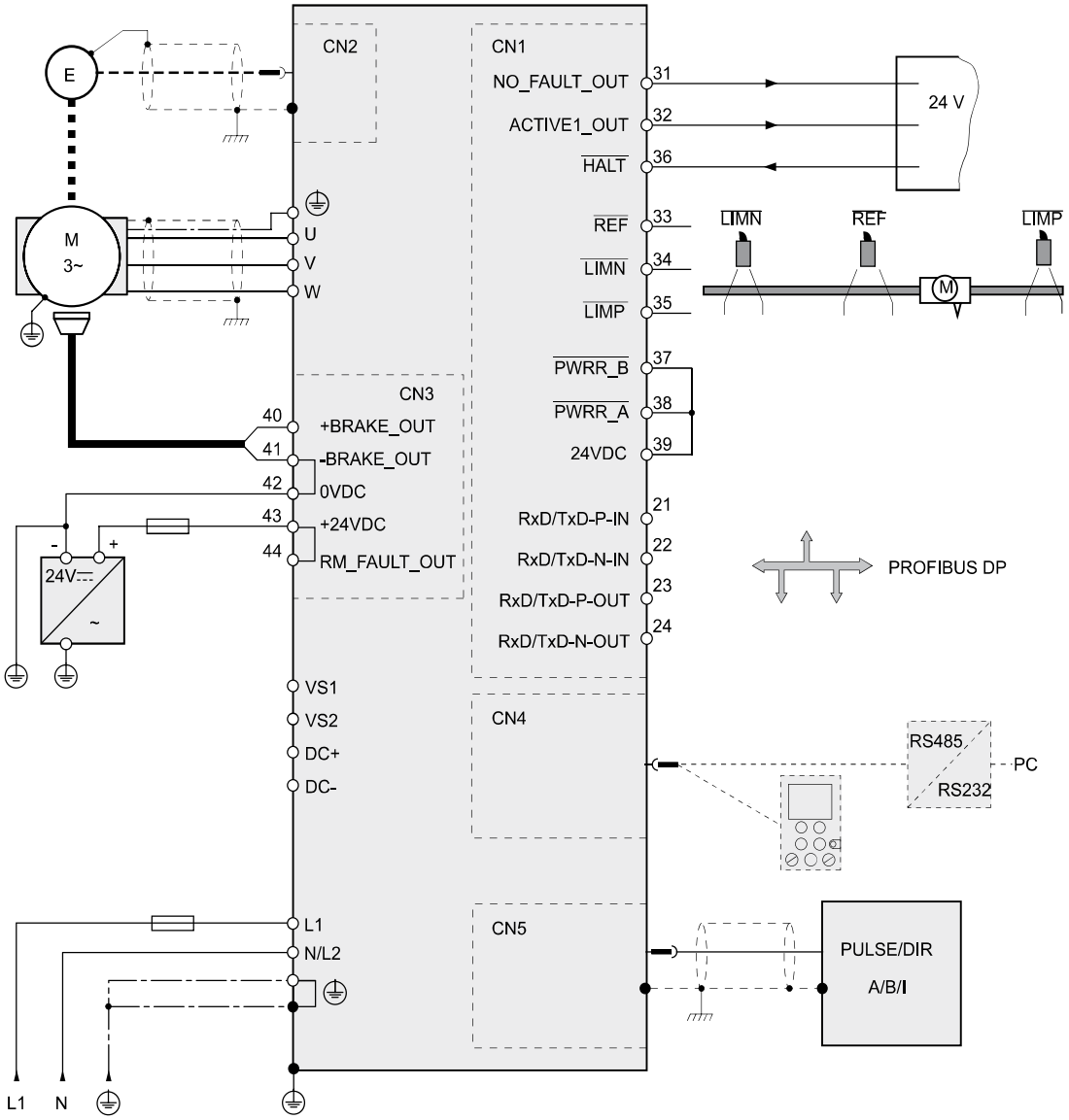
SD328A connection example with local control via ±10 V analogue signals

SD328A connection example with fieldbus control



SD328A connection example with fieldbus control (CANopen)

SD328B connection example with fieldbus control



SD328B connection example with fieldbus control (PROFIBUS DP)

Lexium SD3 motion control
SD328 stepper motor drives

Commissioning functions

The following tools can be used to commission the device:
- Integrated control panel (HMI)
- Remote terminal
- Lexium CT PC commissioning software
- Fieldbus

Two important commissioning functions of the SD328A are explained below. Please refer to the documentation for the stepper motor drive for a detailed description of the commissioning functions.

Control via fieldbus or local (SD328A only)

When the stepper motor drive is started for the first time, the user must specify whether access and parameterisation will be via local control or via fieldbus. This setting can only be modified by restoring the factory settings. The operating modes available for the stepper motor drive also depend on this setting.

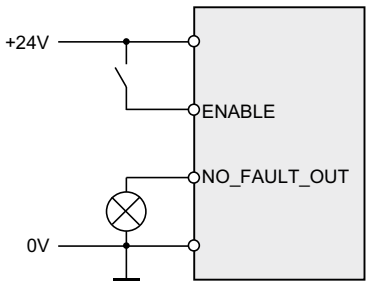
In the case of local control, the integrated control panel (HMI), the remote terminal (equivalent to the integrated control panel in terms of functions) or the Lexium CT PC commissioning software is used for parameterisation. Movements are then preset with a ±10 V analogue signal or with RS 422 signals (pulse/direction signals). Limit switches or reference switches cannot be connected in the case of local control.

In fieldbus control mode, all communication takes place via fieldbus commands.

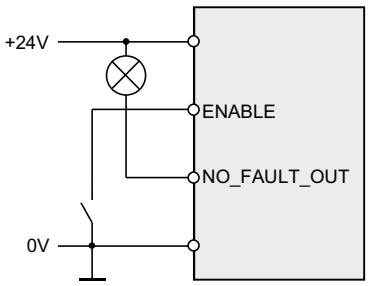
Determining the logic type of signals (SD328A only)

The signal logic (positive or negative) of the 24 V inputs and outputs can be defined during commissioning.
This setting affects the wiring and the way sensors are controlled and must be clarified in the engineering phase with regard to the application.
The SD328A can switch the ⎓ 24 V signal inputs and outputs as follows:
- "Source" logic type:
  signal output supplies current, current flows into the signal input
- "Sink" logic type:
  signal output draws current, current flows from the signal input

By default the device is set to the "Source" logic type.
The PWRR_A and PWRR_B signal inputs for the "Safe Torque Off" safety function (Power Removal "PWRR") always have the "Source" logic type regardless of the setting.



Logic type (Source)



Logic type (Sink)

Operating modes

Overview of operating modes

Operating mode	with SD3..		Control via		Reference value set via
	28 A	28B	Fieldbus	Local	
Jog	■	■	■	■	Fieldbus, Lexium CT PC commissioning software, integrated control panel (HMI)
Oscillator	■	■	■	■	Fieldbus, Lexium CT PC commissioning software, ±10 V analogue signals
Electronic gear	■	■	■	■	Pulse/direction signals, A/B encoder signals
Profile position mode	■	■	■	■	Fieldbus, Lexium CT PC commissioning software
Profile velocity	■	■	■	■	Fieldbus, Lexium CT PC commissioning software
Homing	■	■	■	■	Fieldbus, Lexium CT PC commissioning software
Motion sequence	■	■	■	■	Fieldbus, Lexium CT PC commissioning software

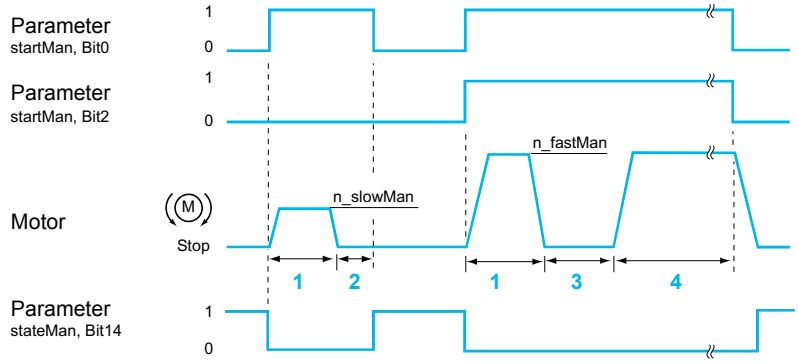
■ Operating mode available
■ Operating mode not available

Jog

The motor moves by one distance unit or at constant speed in continuous operation. The length of the distance unit, the speed levels and the change-over time in continuous operation can be adjusted manually.

Reference value setting
The reference values are set via fieldbus, with the Lexium CT PC commissioning software or the integrated control panel (HMI).

Application example
Setting up a machine during commissioning



Jog, slow and fast

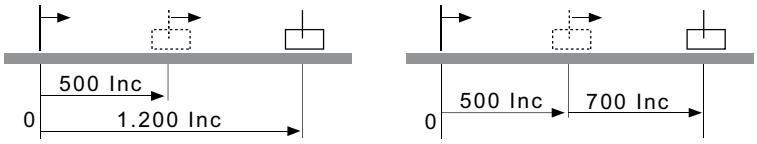
1 JOGstepusr
2 t < JOGtime
3 t > JOGtime
4 Continuous operation

Jog distance, wait time and jog speed can be set. If the jog distance is zero, jog starts directly with continuous movement irrespective of the wait time.

Profile position mode

In the operating mode “Profile Position”, the motor is positioned from a point A to a point B with a positioning command.

Settings
The positioning path can be specified in two ways:
- Absolute positioning, reference point is the zero point of the axis
- Relative positioning, reference point is the current position of the motor



Operating mode “Profile Position”, absolute and relative

Reference value setting
The reference values are set via fieldbus or with the Lexium CT PC commissioning software.

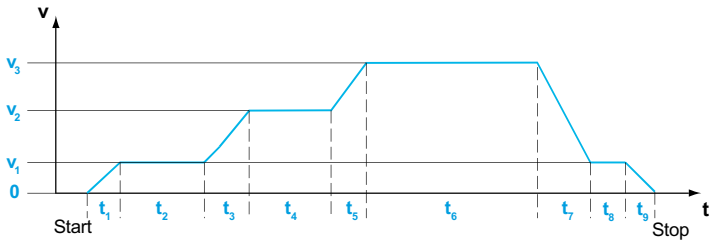
Application example
Pick-and-place with a linear robot

Profile velocity

In operating mode “Profile velocity”, a reference speed for the motor is set and a movement without a target position is started. This speed is maintained until a different reference speed is specified or the operating mode is changed.

Reference value setting
The reference values are set via fieldbus or with the Lexium CT PC commissioning software.

Application example
Paint application in CD manufacture



Profile velocity

t1, t3, t5 = acceleration
t2, t4, t6, t8 = constant movement
t7, t9 = braking

5

5

Homing

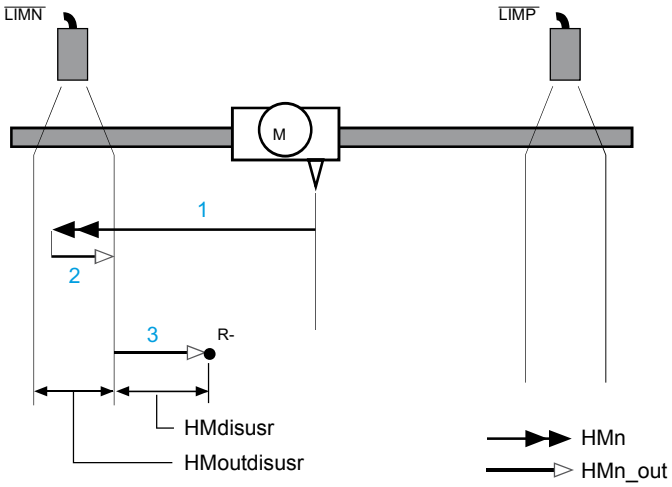
There are two types of homing:
- Reference movement
  Specifying the dimension reference by approach to a limit or reference switch
- Position setting
  Specifying the position reference relative to the current motor position

Reference movement
During reference movement, the motor moves to a defined position on the axis. The defined position is defined with a mechanical switch:
- LIMN and LIMP limit switches
- REF reference switch

Types of reference movements
4 standard reference movements are available
- Movement to negative limit switch LIMN
- Movement to positive limit switch LIMP
- Movement to reference switch REF with counterclockwise direction of rotation
- Movement to reference switch REF with clockwise direction of rotation

In addition, a reference movement can be with or without index pulse.
- Reference movement without index pulse
- Movement from switching edge to a parameterisable distance from the switching edge
- Reference movement with index pulse
- Movement from the switching edge to the physical index pulse of the motor

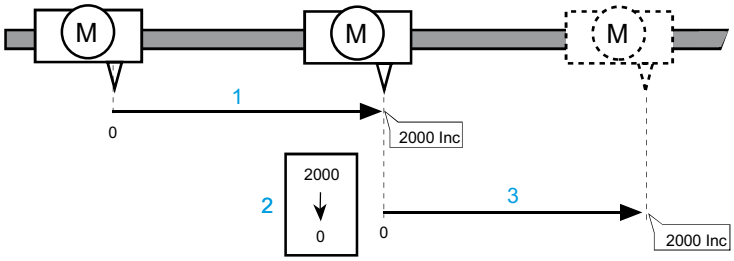
Example 1: Reference movement to limit switch



Operating mode "Homing", reference movement to the negative limit switch

1 Movement to limit switch at search speed
2 Movement to switching edge at clearance speed
3 Movement to distance from switching edge at clearance speed

Example 2: position setting
Position setting can be used to execute a continuous motor movement without overtravelling the positioning limits.



Positioning by 4000 increments with position setting

1 The motor is positioned by 2000 increments.
2 The current motor position is set to position value 0 by position setting to 0 and the new zero point is defined at the same time.
3 The new target position is 2000 increments after a new movement command by 2000 increments is triggered.

This procedure prevents overtravel of the absolute position limits during positioning, because the zero point is set continuously.

Reference value setting
The reference values are set via fieldbus or with the Lexium CT PC commissioning software.

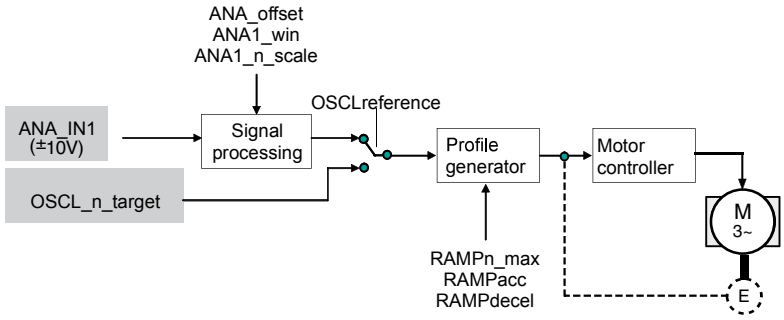
Application example
Prior to absolute positioning in “Profile Position” mode.

Oscillator (SD328A only)

In “Oscillator” operating mode, the speed of rotation of the motor is set via a ±10-V analogue signal or via fieldbus parameters.

Reference value setting
The reference values are set via fieldbus, with the Lexium CT PC commissioning software or ±10-V analogue signals.

Application example
Roller control in roller conveyors.



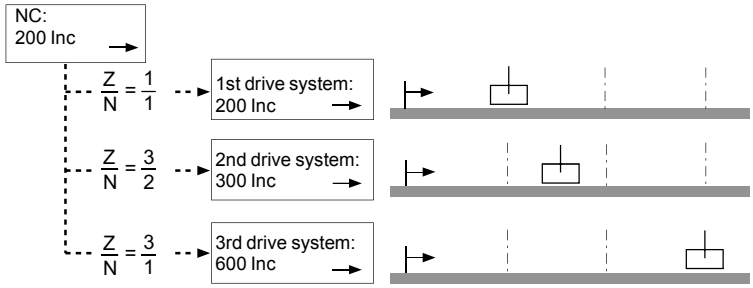
Overview of “Oscillator” operating mode

Electronic gear

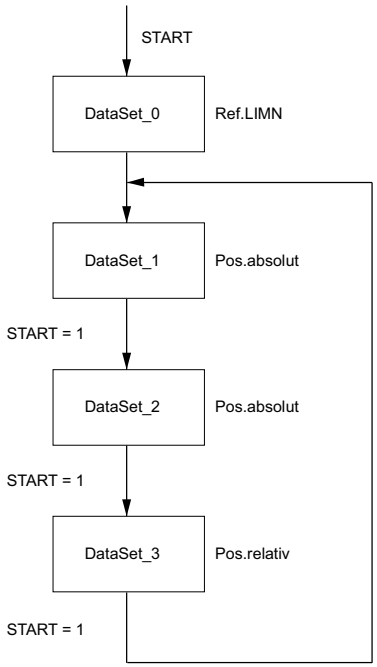
In “Electronic Gear” operating mode, the reference signals are supplied from an encoder (A/B signals) or a controller (pulse/direction signals) and a new position reference value is calculated using an adjustable gear ratio.

Reference value setting
The reference values are supplied as pulse/direction or A/B encoder signals.

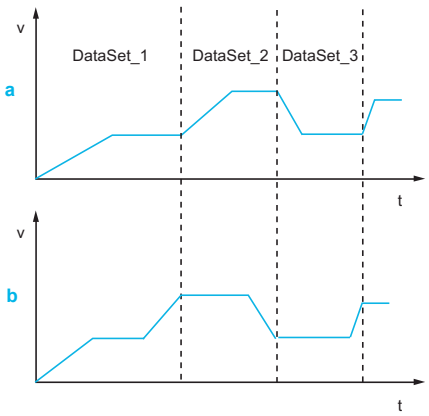
Application example
Synchronisation of motion sequences, e.g. cutting material on a conveyor belt.



“Electronic gear” operating mode



Example of sequential selection of movement commands



Blended movement

"Motion Sequence" operating mode

Presentation

In the "Motion Sequence" operating mode, up to 16 data sets with movement commands can be activated directly or sequentially with a PC, fieldbus or digital inputs. The movement commands can include reference movements or positioning commands. This way, a motion sequence can be saved in the drive system and controlled via a master PLC.
The Lexium CT PC commissioning software or the fieldbus is used to enter data sets and parameterise the drive system.

Direct selection of movement commands

The direct selection of movement commands is used if a master controller (e.g. PLC) controls the time coordination of the various data sets. The data set to be processed is selected via signal inputs and then activated by a start signal.

Sequential selection of movement commands

Sequential selection of the movement commands is used for processing simple motion sequences. The time coordination is programmed in the individual data sets via specification of a wait time, a transition condition and the subsequent data set. A transition condition can be, for instance, a rising edge at the START signal input.
A motion sequence can also be executed cyclically with or without return to the initial position.

Processing status of a movement command

The processing status of a movement command can be output via the handshake output. In addition, an internal processing status such as "drive system in motion" can be output via an additional signal output.

Selection of the motion profile

Speeds and accelerations are saved in motion profiles. One of the motion profiles can be assigned to every movement command data set.

Blended movement

In the case of sequential selection of movement commands, a blended movement can be specified as a transition condition in the data set. When the target position is reached, the drive accelerates or decelerates to the speed of the subsequent data set.
There are two types of blended movement:

Blended movement a
After reaching the target position, the drive switches to the speed of the subsequent data set.

Blended movement b
When the target position is reached, the drive is to have speed of the subsequent data set.

"Safe Torque Off" ("Power Removal") safety function

The SD328 stepper motor drive integrates the "Safe Torque Off" ("Power Removal") safety function which prevents unintended operation of the servo motor. The servo motor no longer produces any torque if the safety function is active.

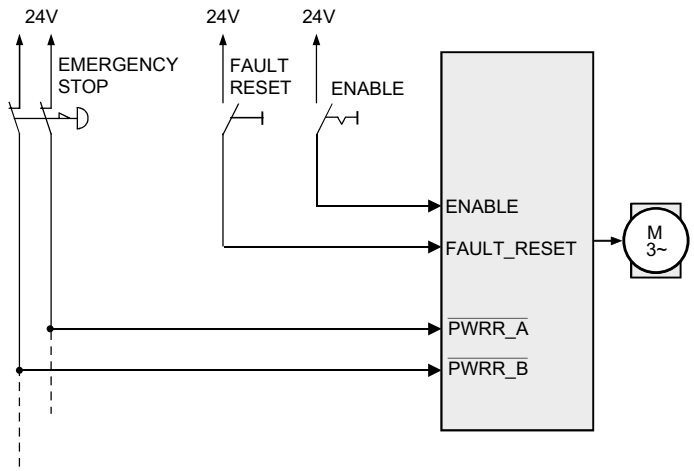
This safety function:
- Complies with the machine safety standard ISO 13849-1, perfomance level "d" (PL d).
- Complies with the standard for functional safety IEC/EN 61508, SIL2 capability (safety control-signalling applied to processes and systems). The SIL (Safety Integrity Level) capability depends on the connection diagram for the servo drive and for the safety function. Failure to observe the setup recommendations could inhibit the SIL capability of the "Safe Torque Off" ("Power Removal") safety function.
- Complies with the product standard IEC/EN 61800-5-2 "Adjustable speed electrical power drive systems – Part 5-2: Safety requirements – Functional" for both stop functions:
  - Safe Torque Off ("STO") corresponds to Category 0 stop according to IEC/EN 60204-1. Standstill by immediate power shutdown to the machine drive elements (i.e. an uncontrolled stop).
  - Safe Stop 1 ("SS1") corresponds to Category 1 stop according to IEC/EN 60204-1. A controlled stop in which the machine drive elements are retained to effect the standstill. The final shutdown is ensured by an external Emergency stop module with safe time delay, e.g. Preventa XPS-AV *(1)*.

The "Safe Torque Off" ("Power Removal") safety function has a redundant electronic architecture which is monitored continuously by a diagnostics function *(2)*.

This PL d and SIL2 safety function is certified as conforming to these standards by the TÜV certification body in the context of a voluntary certification.

(1) Please refer to the "Safety functions and solutions using Preventa" catalogue.
(2) Redundant: Consists of mitigating the effects of the failure of one component by means of the correct operation of another, assuming that faults do not occur simultaneously on both.

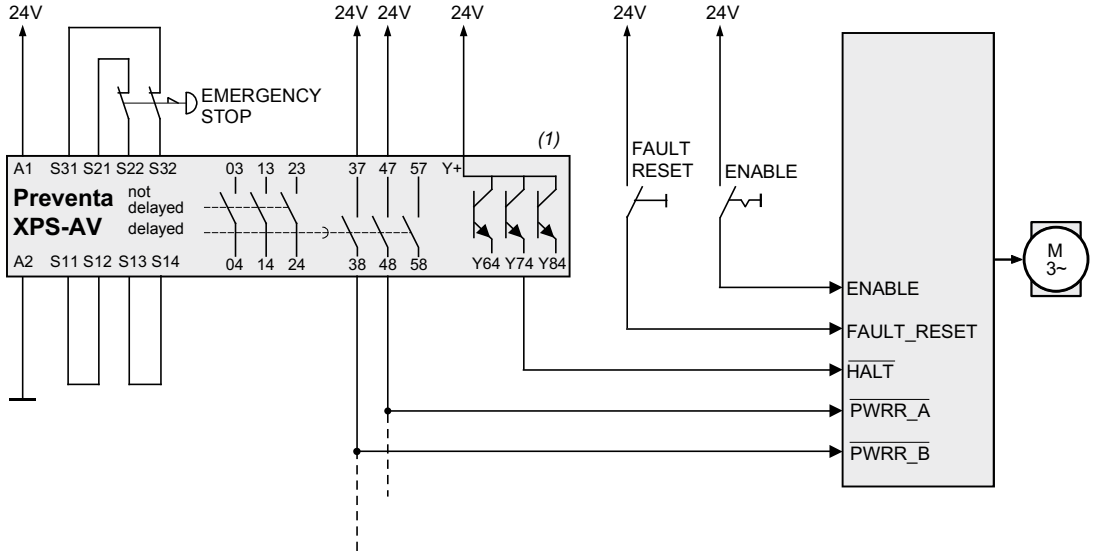
Examples of applications of the safety function



Example category 0 stop

"Safe Torque Off" ("Power Removal") safety function (continued)

Examples of applications of the safety function



Example category 1 stop

Additional operating functions

Additional monitoring and operating functions can be activated via fieldbus, the Lexium CT PC commissioning software or the integrated control panel (HMI):

- ■ Setting motor phase current
- ■ Monitoring functions
- □ Status monitoring during movements
- □ Monitoring of axis signals
- □ Monitoring of internal device signals
- □ Earth (ground) fault and short-circuit monitoring
- ■ Scaling for conversion of user-defined units to internal units
- ■ Setting motion profile via profile generator
- ■ Triggering Quick Stop function
- ■ Setting HALT signal
- ■ Fast position capture
- ■ Velocity window
- ■ Triggering brake functions for motors with holding brake
- ■ Configurable inputs and outputs
- ■ Reversing direction of rotation of motor
- ■ Restoring default values

(1) Preventa XPS-AV, please refer to the "Safety functions and solutions using Preventa" catalogue.

Lexium SD3 motion control
SD328 stepper motor drives

Certifications

Conformity to standards		Lexium Stepper Motor Drive SD3 have been developed to conform to the strictest international standards and with the recommendations for electronic control systems in the industry (IEC, EN), specifically: low-voltage switchgear, IEC/EN 61800-5-1, IEC/EN 50178, IEC/EN 61800-3 (noise immunity to conducted and radiated high-frequency signals)
EMC immunity		IEC/EN 61800-3, environments 1 and 2; IEC/EN 61000-4-2 level 3; IEC/EN 61000-4-3 level 3; IEC/EN 61000-4-4 level 4; IEC/EN 61000-4-5 level 3;
Conducted and radiated EMC emissions		IEC/EN 61800-3: 2001-02 ; IEC 61800-3, ed.2 ■ Devices without external mains filter: □ C3 up to 10m motor cable length ■ Devices without external mains filter: □ C2 up to 20m motor cable length □ C3 up to 50m motor cable length
CE marking		The drives are CE marked in accordance with the European low voltage (2006/95/EC) and EMC (89/336/EEC) directives.
Product certification		UL (USA), cUL (Canada)
		TÜV certification: SD328 stepper motor drives are TÜV-certified for device safety and medical devices. The certification includes: ■ Functional safety of electrical/electronic/programmable safety-related electronic systems (IEC 61508:2000; SIL 2) ■ Safety of machinery – functional safety of safety-related electrical and electronic and programmable electronic control systems (IEC 62061:2005; SILcl2) ■ Safety of machinery – safety-related parts of control systems – Part 1: General principles for design (ISO 13849-1:2006; PL d (Category 3))

Ambient conditions

Ambient temperature *(1)*	**°C**	0 ... +50
Transport and storage temperature	**°C**	-25 ... +70
Pollution degree		Level 2
Relative humidity	**%**	5 ... 85, no condensation allowed
Installation height over m.s.l. without power loss	**m**	< 1000
	m	< 2000 at max. ambient temperature 40°C, no protective film and a lateral distance of > 50mm
Vibration test as per IEC/EN 60068-2-6		3 ... 13 Hz: 1.5 mm peak
		13 ... 150 Hz: 1 gn
Shock test as per IEC/EN 60068-2-27		15 gn for 11 ms
Degree of protection		IP 20
		IP 40 restricted: only from above without removal of protective film.

Electrical data

Mains supply		**SD328●U25**	**SD328●U28**
Nominal voltage (switchable)	**V**	115 / 230 (1~)	115 / 230 (1~)
Current consumption (115 V/230 V)	**A**	4 / 3	7 / 5
Max. nominal motor current	**A**	2.5	6.8
Max. speed of rotation of motor	**rpm**	3000	3000
Nominal power (115 V / 230 V)	**W**	180 / 270	280 / 420
Max. permissible short circuit current of mains	**kA**	0.5	0.5
Power loss	**W**	≤ 26	≤ 65
Fuse to be connected upstream (115V/230V) *(2)*	**A**	6 / 6	10 / 6
Voltage range and tolerance 115 V~	**V**	100 - 15 % ... 120 + 10 %	
230 V~	**V**	200 - 15 % ... 240 + 10 %	
Frequency	**Hz**	50 - 5% ... 60 + 5%	
Transient overvoltages		Overvoltage category III	
Inrush current	**A**	< 60	
Leakage current (as per IEC 60990-3; motor cable length < 10 m)	**mA**	<30	
Fan			
Input voltage	**V⎓**	–	24
Current consumption	**mA**	–	130

(1) No icing
(2) Fuses: class CC fuses or as per UL 248-4, alternatively automatic circuit breakers with B or C characteristic

Electrical data (continued)		
Signal interface (CN1)		
Analogue input signals (SD328A only)		
Differential input voltage range	**V**	-10 ... +10
Resistance	**kΩ**	≥ 10
Resolution ANA1	**bit**	14
Sampling time ANA1	**ms**	0.25
Interface for rotation monitoring (CN2)		
ENC+5V_OUT signal output		sense-controlled, short-circuit-proof, overload-proof
Supply voltage	**V**	4.75 ... 5.25
Max. output current	**mA**	≤ 100
Signal input ENC_A, ENC_B, ENC_I		
Voltage symmetrical	**V**	As per RS 422
Input frequency A/B	**kHz**	≤ 400
Input frequency pulse/direction	**kHz**	≤ 200
24 V interface (CN3)		
24 V control voltage		As per IEC 61131-2
Input voltage	**V**	24 -15% / +20%
Current consumption *(1)*	**A**	≤ 0.2
Residual ripple	**%**	< 5
24 V input signals		As per IEC 61131-2
Logic 1 (U_{high})	**V**	+15 ... +30
Logic 0 (U_{low})	**V**	-3 ... +5
Input current (typical)	**mA**	≤ 10
Debounce time *(2)*	**ms**	1 ... 1.5
Debounce time PWRR_A and PWRR_B	**ms**	1 ... 5
Max. time offset until detection of signal differences between PWRR_A and PWRR_B	**s**	≤ 1
Debounce time CAP1 and CAP2	**µs**	1 ... 10
24 V output signals		As per IEC 61131-2
Output voltage	**V**	≤ 30
Max. switching current	**mA**	≤ 50
Voltage drop at 50 mA load	**V**	≤ 1
Pulse/direction interface (CN5)		
Symmetrical		As per RS 422
Resistance	**kΩ**	5
Pulse/direction frequency	**kHz**	≤ 200
A/B frequency	**kHz**	< 400
CANopen interface (CN1 or CN4) (SD328A only)		
Connections		RJ45 connector (CN4); spring terminals (CN1)
Network management		Slave
Baud rate	**kbps**	125 / 250 / 500 / 1024
Address (node ID)		1 ... 127; configurable with the integrated control panel (HMI) or the Lexium CT PC commissioning software
Max. number of connected stepper motor drives		127
Polarisation		A switchable line terminal resistor is integrated into the stepper motor drives.
Device file		The EDS device file can be downloaded from www.schneider-electric.com.

(1) Without load at the outputs
(2) Except for PWRR_A, PWRR_B, CAP1 and CAP2

Electrical data (continued)

Services		
PDO (Process Data Objects)		Implicit exchange of PDOs (Process Data Objects) ■ 3 PDOs as per DSP 402 (operating modes “Profile Position” and “Profile Velocity”) ■ 1 PDO with freely configurable assignment
PDO operating modes		Event triggering, time triggering, remotely requested; sync, cyclic and acyclic
PDO mapping		1 PDO configurable
SDO		Explicit exchange of SDOs (Service Data Objects) ■ 2 SDO receive ■ 2 SDO send
Emergency		Yes
Profile		CiA DSP 402: CANopen device profile drives and axis control, “Profile Position” and “Profile Velocity” operating modes
Communication monitoring		Node monitoring “Node Guarding”, “Heartbeat”
Diagnostics		2 LED RUN (operation) and ERR (error) on integrated control panel (HMI); Errors are displayed on the integrated control panel (HMI) with the 7-segment display; complete diagnostics data with the Lexium CT PC commissioning software
PROFIBUS DP interface (CN1) (SD328B only)		
Signals		The PROFIBUS DP signals comply with the Profibus standard and are short-circuit protected.
Modbus interface (CN4) (SD328A only)		
Connections		RJ45 connector (CN4)
Physical interface		2-wire, multipoint RS 485
Transmission mode		RTU
Baud rate	**bps**	9600 / 19200 / 38400
Address (node ID)		1 ... 247; configurable with the integrated control panel (HMI) or the Lexium CT PC commissioning software
Max. number of connected stepper motor drives		31
Polarisation		No polarisation impedance. Must be supplied by the wiring system, e.g. in master.
Format		Configurable with the integrated control panel (HMI) or the Lexium CT PC commissioning software ■ 8 bit, odd parity, 1 stop bit ■ 8 bit, even parity, 1 stop bit ■ 8 bit, no parity, 1 stop bit ■ 8 bit, no parity, 2 stop bits
Diagnostics		Errors are displayed by the 7-segment display on the integrated HMI.
Message administration		■ Read hold register (03), max. 63 words ■ Write single register (06) ■ Write multiple registers (16), max. 61 words ■ Read/write multiple registers (23), max. 63/59 words ■ Read device ID (43) ■ Diagnostics (08)
Communication monitoring		Monitoring function (node guarding) can be activated. The timeout can be set from 0.1 s to 10 s.

"Safe Torque Off" safety function (Power Removal "PWRR")			
Protection	Of the machine		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard ISO 13849-1, performance level "d" (PL d), and standard IEC/EN 61800-5-2.
	Of the system process		"Safe Torque Off" safety function which forces stopping and/or prevents unintended restarting of the motor, conforming to standard IEC/EN 61508 level SIL2 and standard IEC/EN 61800-5-2.

Mechanical data			
		SD328●U25	**SD328●U28**
Dimensions (W x H x D)	**mm**	72 x 145 x 140	
Mass	**kg**	1.1	1.2
Type of cooling		Convection	Fan
Max. speed of rotation of motor	**rpm**	3000	

Lexium SD3 motion control
SD328 stepper motor drives

SD328 stepper motor drive

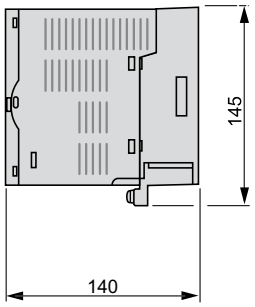
References

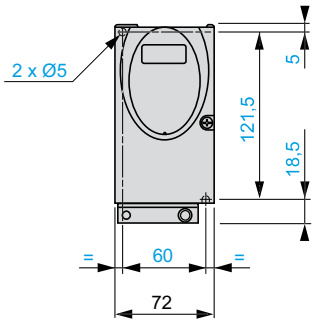
Example:	SD3	28	A	U25	S2
Product designation **SD3** = stepper motor drive 3-phase	**SD3**	28	A	U25	S2
Product type **28** = standard stepper motor drive for fieldbus	SD3	**28**	A	U25	S2
Interfaces **A** = CANopen fieldbus, Modbus fieldbus and analogue input **B** = PROFIBUS DP fieldbus	SD3	28	**A**	U25	S2
Max. motor phase current **U25** = 2.5A **U68** = 6.8A	SD3	28	A	**U25**	S2
Power amplifier supply voltage **S2** = 1~, 115 V~ / 230 V~ (switching)	SD3	28	A	U25	**S2**

5

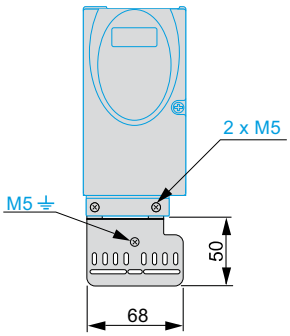
Dimensions

SD328, dimensions in mm





EMC mounting plate (included)



5

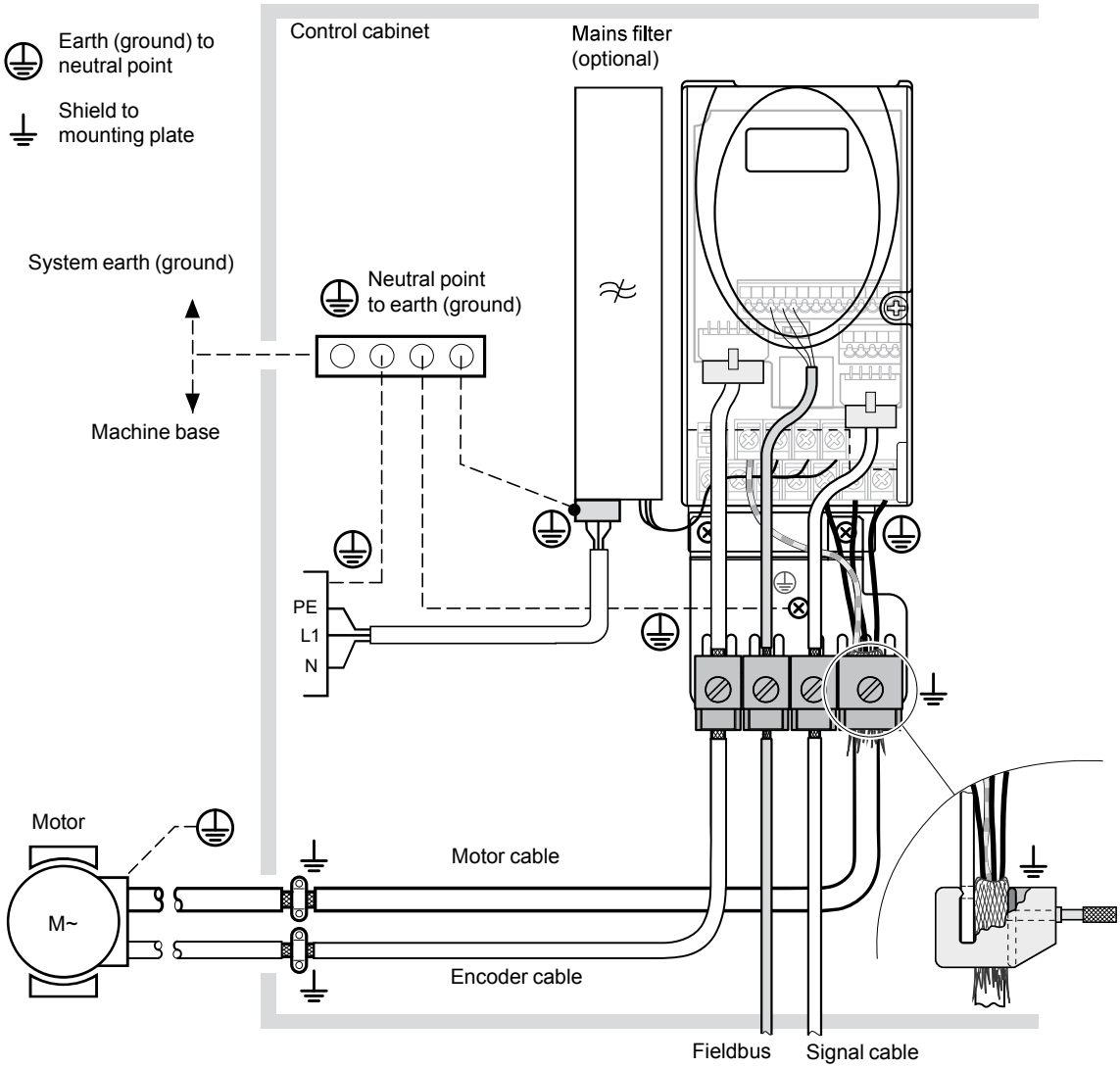
Mounting and installation recommendations

EMC-compliant installation

The SD3 stepper motor drive meets the EMC requirements for the second environment as per IEC 61800-3.
An EMC-compliant design is required to comply with the specified limit values. Depending on the application, better results can be achieved with the following measures:

- Upstream mains reactors. Information on current harmonics can be obtained on request.
- Upstream external mains filters, particularly to comply with the limit values for the first environment (residential area, category C2)
- EMC-compliant design, e.g. in an enclosed control cabinet with 15 dB damping of radiated interference

EMC measures for SD3 stepper motor drive systems

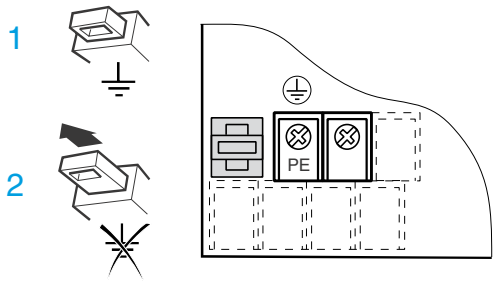


Operation in IT mains

An IT mains is characterised by a neutral conductor that is isolated or earthed through a high impedance. If permanent isolation monitoring is used, it must be suitable for non-linear loads (e.g. type XM200 from Schneider Electric). If an error is signalled in spite of correct wiring, the earth connection of the Y capacitors of products with an integrated mains filter can be disconnected (deactivate Y capacitors).

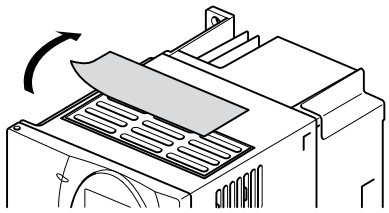
In the case of all other mains systems except for IT mains the earth connection via the Y capacitors remain effective.

If the earth connection of the Y capacitors is disconnected, the specifications for radiation of electromagnetic interference are no longer complied with! Always ensure compliance with national regulations and standards by means of separate measures.



Operation in IT mains

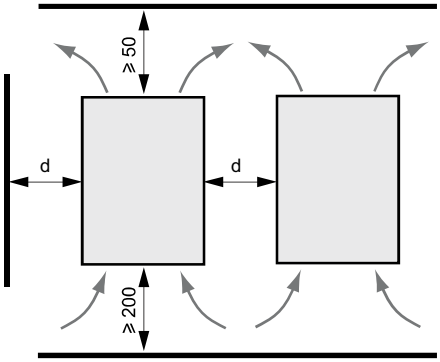
Isolation monitoring error
1 Y capacitors of the internal filter effective (standard)
2 Y capacitors of the internal filter deactivated (IT mains)

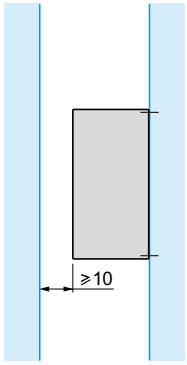


Mounting distances and ventilation

The SD32●●U25 stepper motor drives are ventilated by air circulation from bottom to top. A fan is included with the SD32●●U68 stepper motor drives, which must be mounted to the bottom side of the stepper motor drive.
Note the following when positioning the stepper motor drive in the control cabinet:

- Adequate cooling of the stepper motor drive must be ensured by complying with the minimum installation distances. Prevent heat accumulation.
- The stepper motor drive must not be installed close to heat sources or mounted on flammable materials.
- The warm airflow from other devices and components must not heat the air used for cooling the stepper motor drive.
- The stepper motor drive will switch off as a result of overtemperature when operated above the thermal limits.

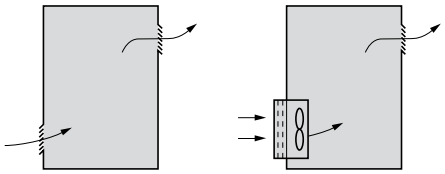




Ambient temperature	Mounting distances	Mounting recommendations	
		Without protective film *(1)*	With protective film
0 ... +40 °C	d > 50 mm	None	None
	d < 50 mm	None	d > 10 mm
+40 ... +50 °C	d > 50 mm	None	Reduce nominal current and continuous current by 2.2 % per °C above 40°C
	d < 50 mm	Reduce nominal current and continuous current	Operation not possible

(1) Recommendation: remove protective film after installation.

The connector cables are routed out of the housing at the bottom. At least 200 mm of free space is required below the stepper motor drive to ensure that cables can be routed without excessive bending.
An alternative to fastening the unit directly to the control cabinet mounting plate is a mounting plate (accessory) for snap-mounting to DIN rails. In this case, EMC filters cannot be attached directly beside or behind the stepper motor drive.



Mounting in housing or control cabinet

Please observe the instructions on mounting in “Mounting distances and ventilation” page 5/38.
Proceed as follows to ensure adequate ventilation of the stepper motor drive:

- Provide air inlet vents on the housing.
- The air inlet vents per stepper motor drive must allow an air flow of a minimum of 0.3 m³/min (SD32●●U25S2) or 0.55 m³/min (SD32●●U68S2). If the air throughput is less, external ventilation units must be installed.
- Use IP 54 special filter.
- Remove the cover on the top of the stepper motor drive.
- The throughput of the fan must be at least 0.3 m³/min.

Steel sheet housing and control cabinet (degree of protection IP 54)

The SD3 stepper motor drive must be installed in a sealed housing under the following ambient conditions: dust, corrosive gases, high humidity with the danger of condensation and surface water, etc. Observe the maximum permissible ambient temperature of the stepper motor drive when installing it in a sealed housing.

Calculation of housing dimensions

Maximum heat resistance R_{th} in °C/W

$R_{th} = (\theta - \theta_e)/P$

θ = maximum temperature (°C) inside the housing
θ_e = maximum outside temperature (°C)
P = total power loss (W) in the housing

See “Characteristics” for the power loss of the stepper motor drives.
Consider the power loss of the other components.

Usable heat dissipation surface of housing A in m²

(for wall mounting: side surfaces + top + front)

$A = K/R_{th}$

K = heat resistance, based on the housing surface
Steel sheet housing: K = 0.12 with fan, K = 0.15 without fan

Note: *because of the poor heat dissipation, insulating material housings must not be used.*

Lexium SD3 motion control
BRS3 3-phase stepper motors

Stepper motor drive system

Presentation

A stepper motor drive system consists of a stepper motor and the matching stepper drive. The 3-phase stepper motors from Schneider Electric are extremely robust, maintenance-free motors. They carry out precise step-by-step movements that are controlled by a stepper motor drive. Maximum power can only be obtained if motor and electronics are perfectly tuned to each other.

The 3-phase stepper motors can be operated at very high resolutions depending on the stepper motor drive.

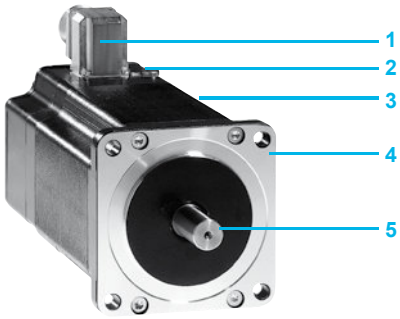
Options such as rotation monitoring and holding brake as well as robust, planetary gears with little backlash extend the application possibilities.

Special features

Quiet
As a result of the sine commutation and the special mechanical design of the motors, the stepper motors are very quiet and run virtually without resonance.

Strong
The optimised internal geometry of the motor ensures a high power density;

Flexible
With the flexible modular system and modern variant management, a wide variety of motor types can be manufactured and delivered in a very short time.



Description

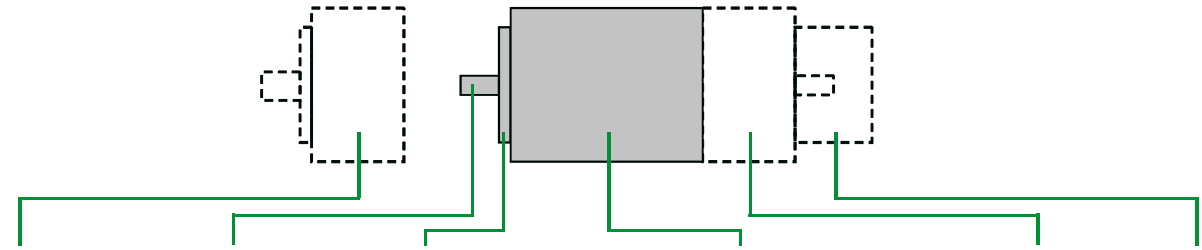
1 Motor connection, here a version with an angular connector
2 Additional terminal for protective conductor
3 Housing, with black protective coating
4 Axial flange with four mounting points as per DIN 42918
5 Smooth shaft end as per DIN 42918

Product offer

3-phase stepper motors		BRS368	BRS39●	BRS3A●
Size		6	9	A
Max. torque M_{max}	Nm	1.50	2.0...6.0	12.0...16.5
Holding torque M_H	Nm	1.70	2.26 ... 6.78	13.5 ... 19.7
Number of steps z *(1)*		200 / 500 / 1000 / 2000 / 4000 / 5000 / 10000		
Step angle α *(1)*	°	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036		

(1) The 1st value is the holding torque M_H when the stepper motor is at a standstill, the 2nd value is the nominal torque M_N when the motor is in operation.

Motor types



Planetary gearox *(1)*	Shaft version		Centring collar	Flange size	Length (without shaft)	Winding	Motor connection	Options *(2)*
BRS368								
GBX 60	Smooth shaft	Ø 6.35 mm Ø 8 mm	Ø 38.1 mm	6 (57.2 mm)	8 (79 mm)	W	Terminal box Connector	2nd shaft end Holding brake Encoder
BRS39●								
GBX 80	Smooth shaft with woodruff key *(3)*	Ø 9.5 mm *(5)* Ø 12 mm *(5)* Ø 14 mm *(5)*	Ø 60 mm Ø 73 mm	9 (85 mm)	7 (68 mm) 10 (98 mm) 13 (128 mm)	W	Terminal box Connector	2nd shaft end Holding brake Encoder
BRS3A●								
GBX 120 GBX 160	Smooth shaft with parallel key *(4)*	Ø 19 mm	Ø 56 mm	11 (110 mm)	17 (180 mm) 22 (228 mm)	W	Terminal box Connector	2nd shaft end Holding brake Encoder

(1) Planetary gearbox with various ratios available as accessory see page 5/65
(2) The 2nd shaft end and holding brake options cannot be selected in combination. An encoder can only be used with motors with "connector" type motor connection.
(3) Conforming to DIN 6888.
(4) Conforming to DIN 6885.
(5) Ø 9.5 mm and Ø 12 mm with BRS397 and BRS39A; Ø 14 mm with BRS39B

Lexium SD3 motion control
BRS3 3-phase stepper motors

Ambient conditions

Ambient temperature		**°C**	-25 ... +40
Max. installation height over m.s.l. without power loss		**m**	< 1000
Transport and storage temperature		**°C**	-25 ... +70
Relative humidity		**%**	15 ... 85, no condensation allowed
Vibration grade during operation conforming to IEC/EN 60034-14			A
Max. vibration load		**m/s²**	20
Degree of protection conforming to IEC/EN 60034-5	Total except shaft bushing		IP 56
	Shaft bushing		IP 41
Thermal class			155 (F)
Shaft wobble and perpendicularity			DIN EN 50 347 (IEC 60072-1)
Max. rotary acceleration		**rad/s²**	200000

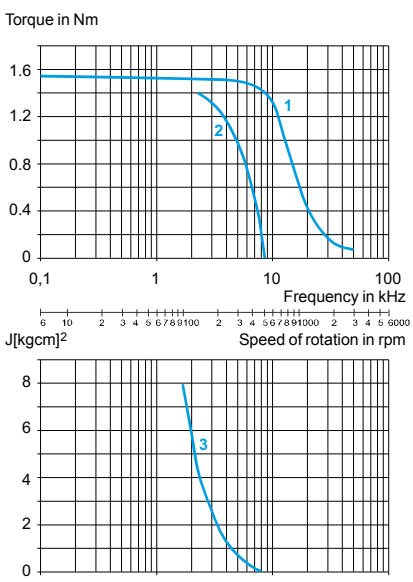
Electrical and mechanical data

BRS motor type				**368**	**397**	**39A**	**39B**	**3AC**	**3AD**
Max. supply voltage		U_{max}	≂ **V**	230					
Nominal voltage DC bus		U_N	⎓ **V**	325					
Nominal torque		M_N	**Nm**	1.50	2	4	6	12	16.5
Holding torque		M_H	**Nm**	1.70	2.26	4.52	6.78	13.5	19.7
Rotor inertia		J_R	**kgcm²**	0.38	1.1	2.2	3.3	10.5	16
Number of steps		**z**		200 / 400 / 500 / 1000 / 2000 / 4000 / 5000 / 10000					
Step angle		**α**	**°**	1.8 / 0.9 / 0.72 / 0.36 / 0.18 / 0.09 / 0.072 / 0.036					
Systematic angle tolerance *(1)*		$\Delta\alpha_s$	**arcmin**	±6					
Max. starting frequency		f_{Aom}	**kHz**	8.5	5.3			4.7	
Phase current		I_N	A_{rms}	0.9	1.75	2	2.25	4.1	4.75
Winding resistance		R_W	Ω	25	6.5	5.8	6.5	1.8	1.9
Current rise time constant		**ζ**	**ms**	4.6	≈7	≈9	≈10	≈22	≈22
Mass *(2)*		**m**	**kg**	2.0	2.1	3.2	4.3	8.2	11.2
Shaft load *(3)*	Max. radial force 1st shaft end *(4)*		**N**	50	100		110	300	
	Max. radial force 2nd shaft end (optional) *(4)*		**N**	25	50			150	
	Max. axial tensile force		**N**	100	175			330	
	Max. axial force pressure		**N**	8.4	30			60	
	Nominal bearing service life *(5)*	L_{10h}	**h**	20000	20000			20000	

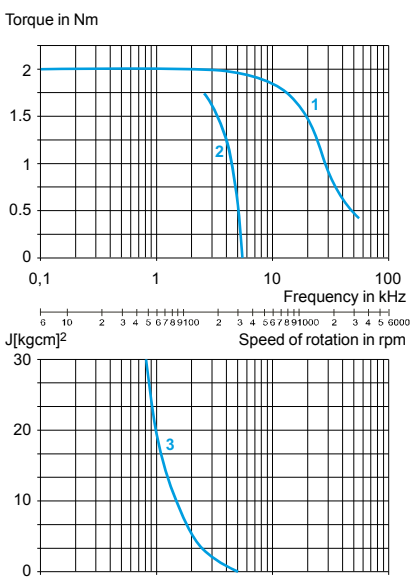
(1) Measured at 1000 steps/revolution.
(2) Mass of the motor version with cable gland and connector.
(3) Conditions for shaft load: speed of rotation 600 rpm, 100% duty cycle at nominal torque, ambient temperature 40 °C (bearing temperature ≈ 80 °C).
(4) Point of application of radial force: centre of shaft end.
(5) Operating hours with a probability of failure of 10%.

Characteristic curves

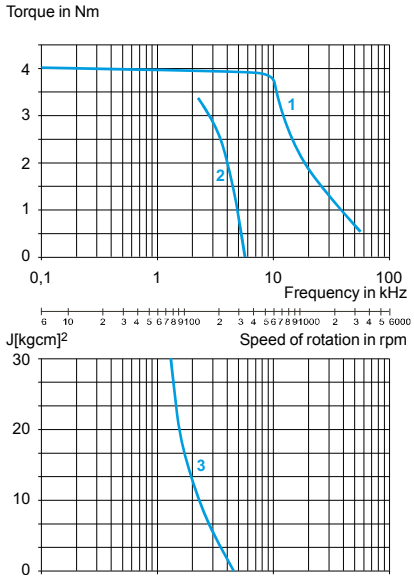
BRS368



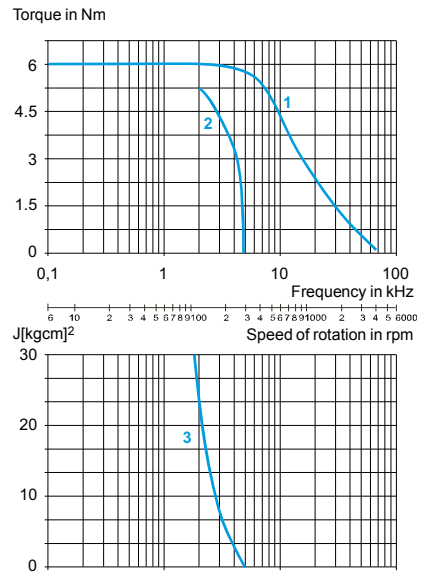
BRS397



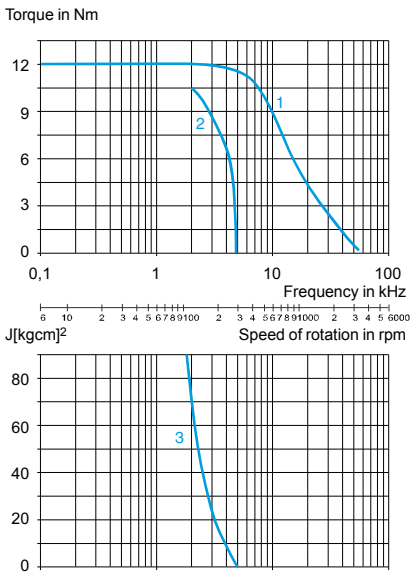
BRS39A



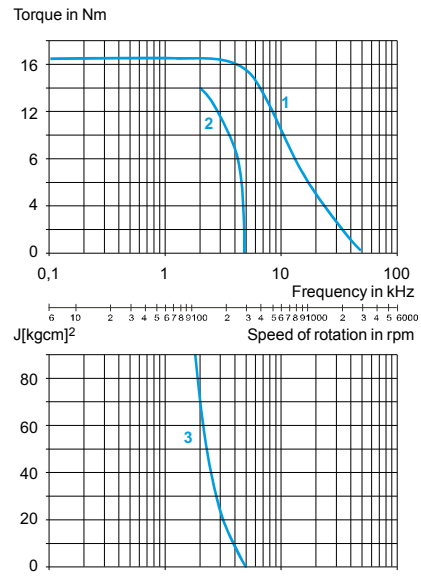
BRS39B



BRS3AC



BRS3AD



1 Pull-out torque
2 Pull-in torque
3 Maximum load inertia

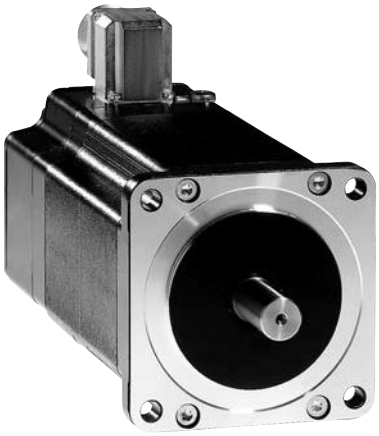
Measurement at 1000 steps/revolution, nominal voltage DC bus U_N and phase current I_N

Lexium SD3 motion control
BRS3 3-phase stepper motors

BRS368 3-phase stepper motor

Stepper motor BRS368

Example:	B	R	S	3	6	8	W	1	3	0	A	B	A
Motor type **S** = stepper motor	B	R	**S**	3	6	8	W	1	3	0	A	B	A
Motor phases **3** = 3-phase stepper motor	B	R	S	**3**	6	8	W	1	3	0	A	B	A
Size **6** = 57.2 mm	B	R	S	3	**6**	8	W	1	3	0	A	B	A
Motor length **8** = 79 mm	B	R	S	3	6	**8**	W	1	3	0	A	B	A
Maximum voltage **W** = 230 V~ (325 V⎓)	B	R	S	3	6	8	**W**	1	3	0	A	B	A
Shaft version **0** = smooth shaft (Ø 6.35 mm, IP 41) **1** = smooth shaft (Ø 8 mm, IP 41)	B	R	S	3	6	8	W	**1**	3	0	A	B	A
Centring collar **3** = 38 mm	B	R	S	3	6	8	W	1	**3**	0	A	B	A
Position capture **0** = without encoder **1** = with encoder (1000 inc/rev)	B	R	S	3	6	8	W	1	3	**0**	A	B	A
Holding brake **A** = without holding brake **B** = with holding brake	B	R	S	3	6	8	W	1	3	0	**A**	B	A
Connection type **B** = terminal box **C** = connector	B	R	S	3	6	8	W	1	3	0	A	**B**	A
Second shaft **A** = without second shaft **B** = with second shaft	B	R	S	3	6	8	W	1	3	0	A	B	**A**

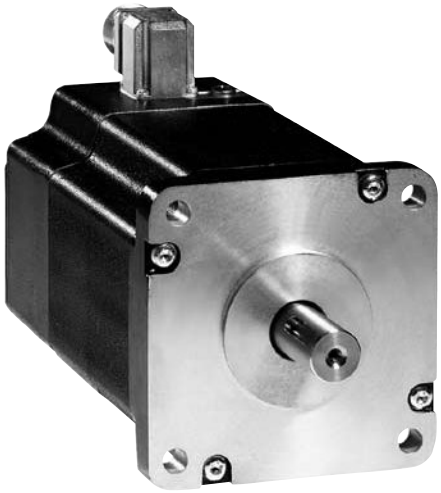


BRS39● 3-phase stepper motor

Stepper motor BRS39●

Example:	B	R	S	3	9	7	W	2	6	0	A	B	A
Motor type **S** = stepper motor	B	R	**S**	3	9	7	W	2	6	0	A	B	A
Motor phases **3** = 3-phase stepper motor	B	R	S	**3**	9	7	W	2	6	0	A	B	A
Size **9** = 85 mm	B	R	S	3	**9**	7	W	2	6	0	A	B	A
Motor length **7** = 68 mm **A** = 98 mm **B** = 128 mm	B	R	S	3	9	**7**	W	2	6	0	A	B	A
Maximum voltage **W** = 230 V~ (325 V⎓)	B	R	S	3	9	7	**W**	2	6	0	A	B	A
Shaft version *(1)* **2** = smooth shaft (Ø 9.5 mm, IP 41) **3** = smooth shaft (Ø 12 mm, IP 41) **4** = smooth shaft (Ø 14 mm, IP 41) **5** = woodruff key (Ø 9.5 mm, IP 41) **6** = woodruff key (Ø 12 mm, IP 41) **7** = woodruff key (Ø 14 mm, IP 41) **A** = smooth shaft (Ø 9.5 mm, IP 56) **B** = smooth shaft (Ø 12 mm, IP 56) **C** = smooth shaft (Ø 14 mm, IP 56) **K** = woodruff key (Ø 14 mm, IP 56) **L** = woodruff key (Ø 9.5 mm, IP 56) **M** = woodruff key (Ø 12 mm, IP 56)	B	R	S	3	9	7	W	**2**	6	0	A	B	A
Centring collar **6** = 60 mm **7** = 73 mm	B	R	S	3	9	7	W	2	**6**	0	A	B	A
Position capture **0** = without encoder **1** = with encoder (1000 Inc/rev)	B	R	S	3	9	7	W	2	6	**0**	A	B	A
Holding brake **A** = without holding brake **F** = with holding brake	B	R	S	3	9	7	W	2	6	0	**A**	B	A
Connection type **B** = terminal box **C** = connector	B	R	S	3	9	7	W	2	6	0	A	**B**	A
Second shaft **A** = without second shaft end **B** = with second shaft end	B	R	S	3	9	7	W	2	6	0	A	B	**A**

(1) Possible combinations of motor length and shaft version:
motor length **7** = 2, 3, 5, 6, A, B, K, L;
motor length **A** = 2, 3, 5, A, B, K, L;
motor length **B** = 4, 7, C, M

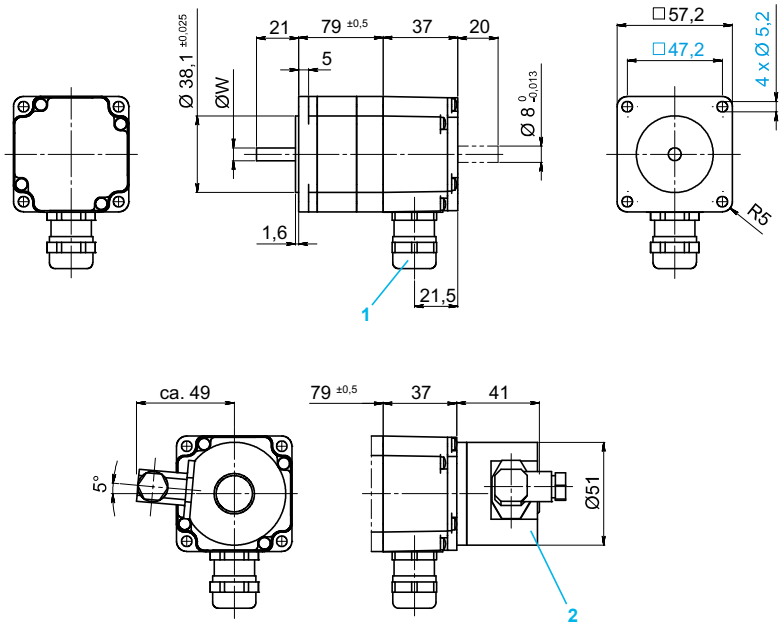


BRS3A● 3-phase stepper motor

Stepper motor BRS3A●													
Example:	**B**	**R**	**S**	**3**	**A**	**C**	**W**	**8**	**5**	**0**	**A**	**B**	**A**
Motor type **S** = stepper motor	B	R	**S**	3	A	C	W	8	5	0	A	B	A
Motor phases **3** = 3-phase stepper motor	B	R	S	**3**	A	C	W	8	5	0	A	B	A
Size **A** = 110 mm	B	R	S	3	**A**	C	W	8	5	0	A	B	A
Motor length **C** = 180 mm **D** = 230 mm	B	R	S	3	A	**C**	W	8	5	0	A	B	A
Maximum voltage **W** = 230 V~ (325 V⎓)	B	R	S	3	A	C	**W**	8	5	0	A	B	A
Shaft version **8** = parallel key (Ø 19 mm, IP 41)	B	R	S	3	A	C	W	**8**	5	0	A	B	A
Centring collar **5** = 56 mm	B	R	S	3	A	C	W	8	**5**	0	A	B	A
Position capture **0** = without encoder **1** = with encoder (1000 Inc/rev)	B	R	S	3	A	C	W	8	5	**0**	A	B	A
Holding brake **A** = without holding brake **F** = with holding brake	B	R	S	3	A	C	W	8	5	0	**A**	B	A
Connection type **B** = terminal box **C** = connector	B	R	S	3	A	C	W	8	5	0	A	**B**	A
Second shaft **A** = without second shaft end **B** = with second shaft end	B	R	S	3	A	C	W	8	5	0	A	B	**A**

Dimensions

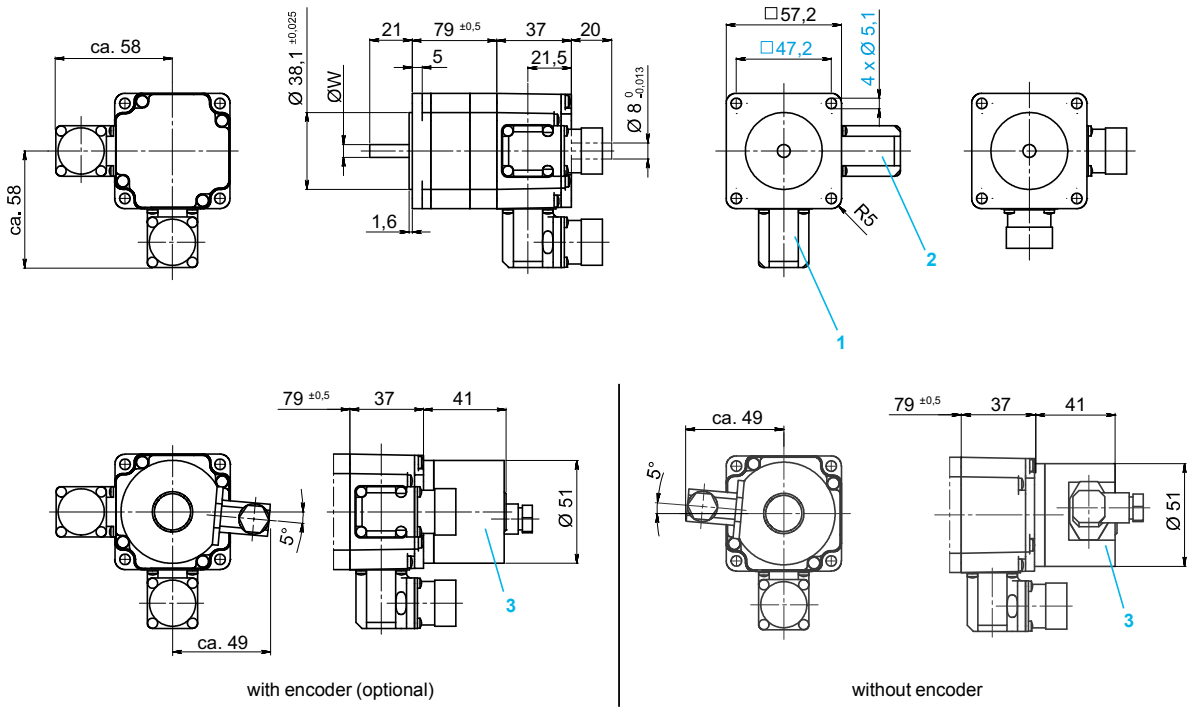
BRS368 3-phase stepper motor in terminal box version



	Shaft diameter ØW
BRS368	6.35 ±0,013
	8 ±0.013

1 Cable gland M20 x 1.5 for cable Ø 9 ... 13
2 Holding brake (optional)

BRS368 3-phase stepper motor in connector version



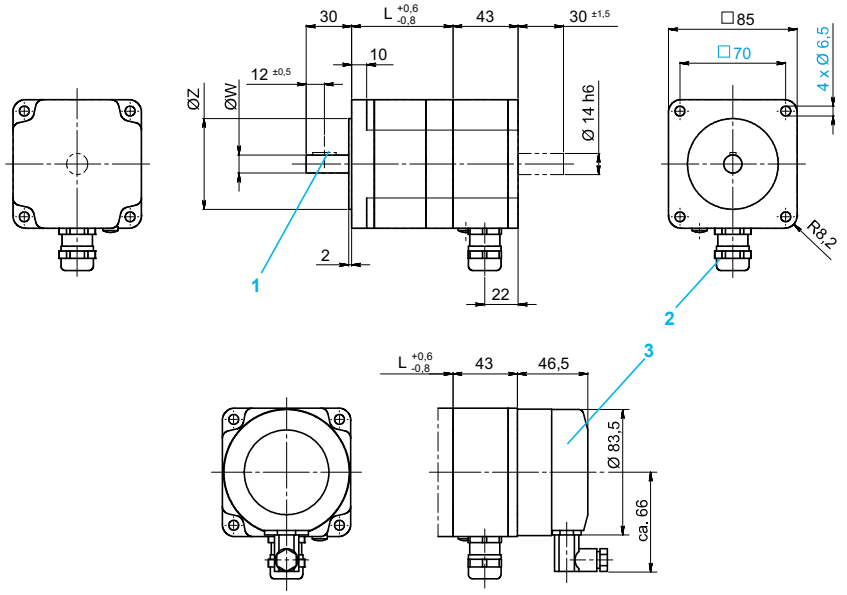
with encoder (optional)

without encoder

	Shaft diameter ØW
BRS368	6.35 ±0.013
	8 ±0.013

1 Plug connection encoder (optional) 12 poles
2 Plug connection motor 6 poles
3 Holding brake (optional)

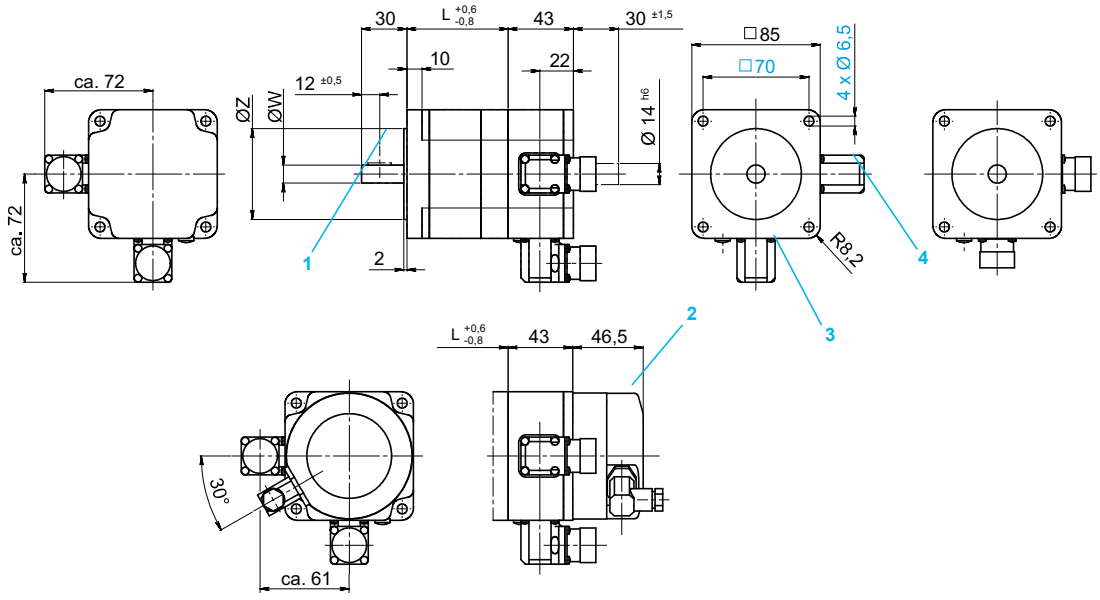
BRS39● 3-phase stepper motor in terminal box version



	Length L	Shaft diameter ØW		Centring collar ØZ	
BRS397	67.5	9.5 h6	12 h6	60 h8	73 h8
BRS39A	97.5	9.5 h6	12 h6	60 h8	73 h8
BRS39B	127.5	14 h6		60 h8	73 h8

1 Woodruff key DIN 6888 (optional): shafts Ø 9.5: 3 x 5; shafts Ø 12: 4 x 6.5; shafts Ø 14: 5 x 6.5
2 Cable gland M20 x 1,5 for cable Ø 9 ... 13
3 Holding brake (optional)

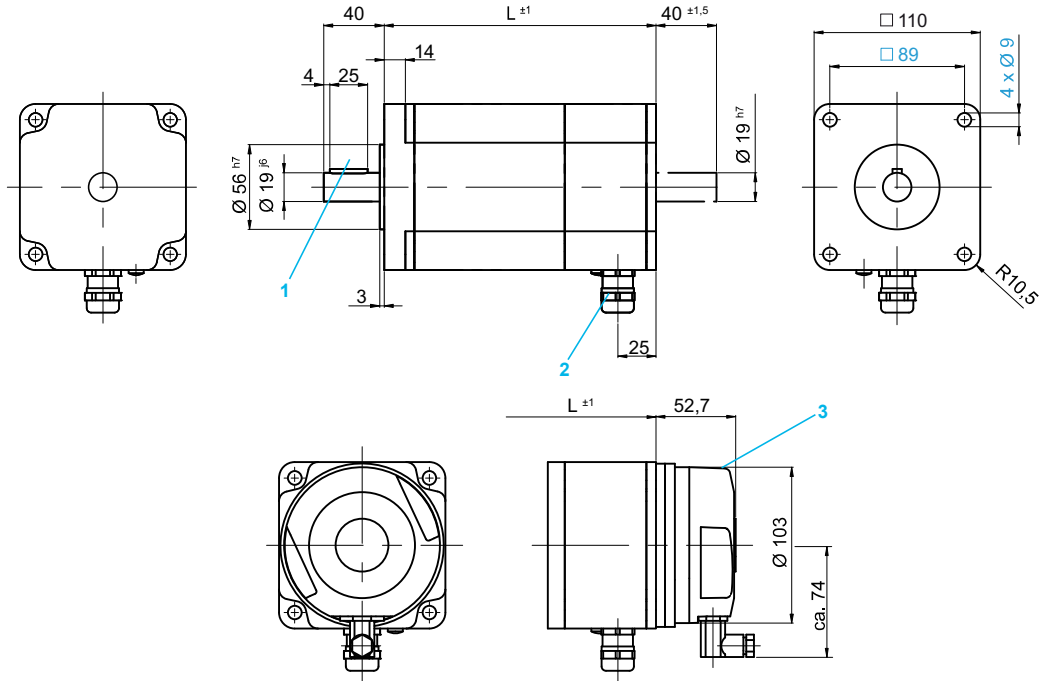
BRS39● 3-phase stepper motor in connector version



	Length L	Shaft diameter ØW		Centring collar ØZ	
BRS397	67.5	9,5 h6	12 h6	60 h8	73 h8
BRS39A	97.5	9.5 h6	12 h6	60 h8	73 h8
BRS39B	127.5	14 h6		60 h8	73 h8

1 Woodruff key DIN 6888 (optional): shafts Ø 9.5: 3 x 5; shafts Ø 12: 4 x 6.5; shafts Ø 14: 5 x 6.5
2 Holding brake (optional)
3 Motor connection 6 poles
4 Motor connection (optional) 12 poles

BRS3A● 3-phase stepper motor in terminal box version

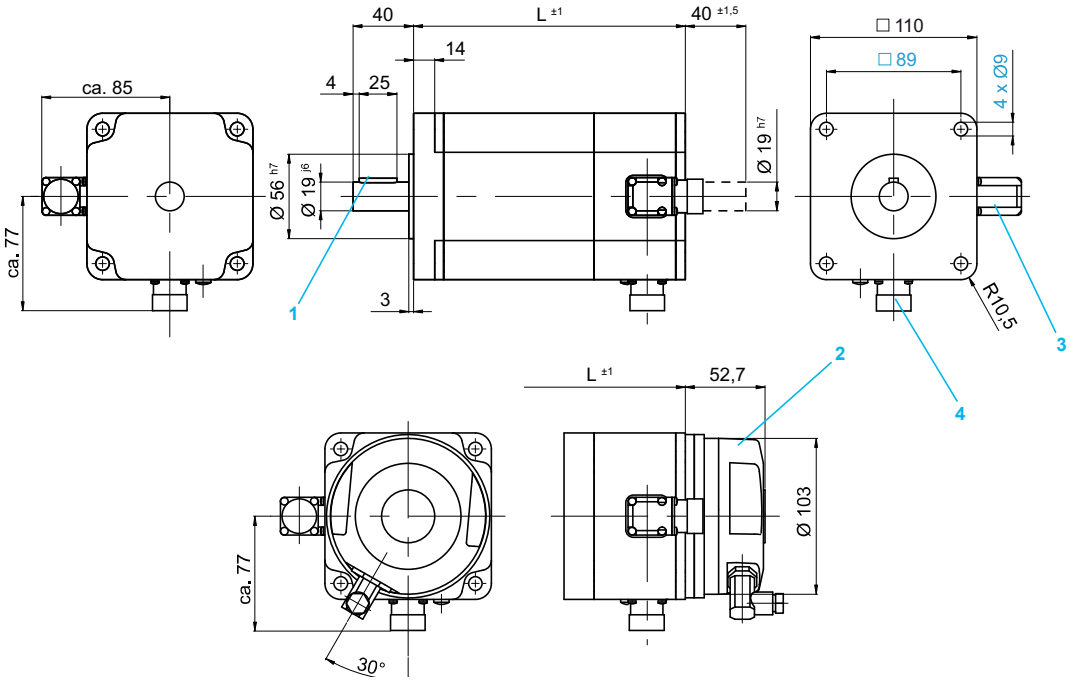


	Length L
BRS3AC	180
BRS3AD	228

1 Parallel key DIN 6885: A 6 x 6 x 25
2 Cable gland M20 x 1.5 for cable Ø 9 ... 13
3 Holding brake (optional)

5

BRS3A● 3-phase stepper motor in connector version



	Length L
BRS3AC	180
BRS3AD	228

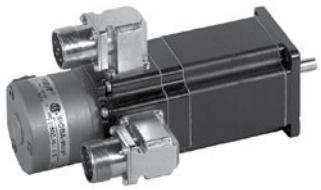
1 Parallel key DIN 6885: A 6 x 6 x 25
2 Holding brake (optional)
3 Plug connection encoder (optional) 12 poles
4 Plug connection motor 6 poles

5

Lexium SD3 motion control

BRS3 3-phase stepper motors

Option: Holding brake



Holding brake

Presentation

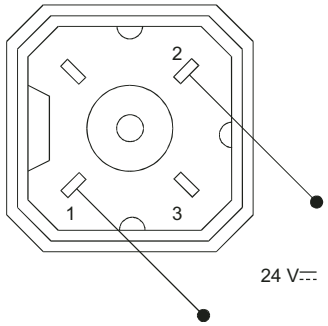
The holding brake is an electromagnetic spring force brake and fixes the motor shaft after the motor current is switched off (e.g. in case of power failure or Emergency stop).
The motor shaft must be fixed if torque loads resulting from weights act on it, e.g. in the case of Z axes in handling systems.

Characteristics

Holding brake for motor type		BRS368	BRS39●	BRS3A●
Nominal voltage	**V**	24	24	24
Holding torque	**Nm**	1	6	16
Electrical pull-in power	**W**	8	24	28
Moment of inertia	**kgcm²**	0.016	0.2	0.35
Brake release time	**ms**	58	40	60
Brake application time	**ms**	14	20	30
Mass	**kg**	0.5	1.5	2.0

Note: *In order to ensure the safe function of the holding brake for Z-axes, the static load torque must be no greater than 25% of the holding torque of the motor.*

Wiring diagram

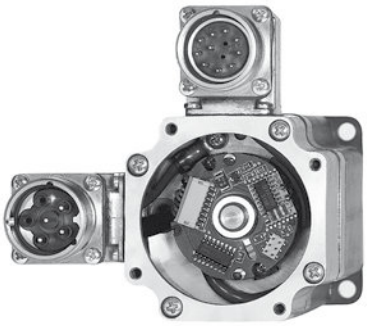


The connector is part of the scope of delivery.
Connector designation: Hirschmann type G4 A 5M

Lexium SD3 motion control

BRS3 3-phase stepper motors

Option: Encoder



Encoder

Presentation

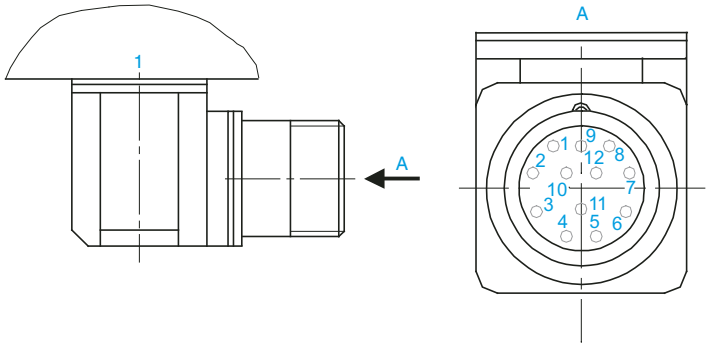
The BRS3 3-phase stepper motors from Schneider Electric can be fitted with an encoder. If the stepper motor drive is fitted with rotation monitoring electronics, the encoder operates as a measurement system for signalling the actual position of the rotor.
The calculated reference position and the actual position of the motor are compared. If a defined deviation is exceeded, a rotation monitoring error is signalled. For example, this enables detection of mechanical overload of the motor.

Note: *an encoder can only be used with motors with connector. A temperature sensor is integrated to protect the encoder from high temperatures.*

Characteristics

Resolution	**Inc/rev.**	1000
Index pulse	**Inc/rev.**	1
Output		RS 422
Signals		A; B; I
Signal shape		Rectangular
Supply voltage	**V**	5 ± 5%
Supply current	**A**	Max. 0.125

Wiring diagram



Wiring diagram of encoder plug on BRS3●●

1 Motor housing

Pin	Designation
1	A
2	A negated
3	B
4	B negated
5	C, I
6	C negated, I negated
7	5 V_{GND}
8	+ 5
9	-SENSE
10	+SENSE
11	Temperature sensor
12	Not connected

Lexium SD3 motion control

Integrated and optional additional EMC filters for stepper motor drives SD3

Presentation

EMC filter

A filter is integrated in the SD3 as standard equipment so the devices complies with the IEC/EN 61800-3 electromagnetic compatibility (EMC) standards. These standards must be complied with for CE marking under the EMC directive.
With the additional filter it is possible to meet more rigid requirements.
This drive system meets the EMC requirements for the second environment according to IEC 61800-3, if the described measures are taken into account during installation. If the device is not used within the context of this application area, the following must be noted:
Better values can be achieved depending on the device and the application as well as the design, e.g. if the unit is mounted in a closed control cabinet.
If the limit values for the first environment (public mains, category C2) are required, external filters must be connected upstream.
The following limit values for conducted interference are met if the design is EMC-compatible:

Without external filter	C3 up to 10 m motor cable length
With external filter	C2 up to 20 m motor cable length C3 up to 50 m motor cable length

The owner/operator must ensure compliance with the EMC directives.

Usage depending on the mains type

This filter can only be used in TN networks (connection to neutral conductor) and TT networks (neutral conductor connected to earth (ground)).
The filters cannot be used in IT mains (isolated neutral conductor or neutral conductor earthed (grounded) via high impedance).
IEC 61800-3, Annex D2.1, states that the filters may not be used for this mains type because correct operation of the isolation monitoring equipment cannot be guaranteed.
In addition, the efficiency of the filter in this mains type depends on the type of impedance between neutral conductor and earth (ground). Therefore, the efficiency is not predictable.
An isolating transformer is required for machines that must be installed in an IT mains to allow the machine to be operated locally as in a TN or TT system.

Characteristics

Compliance with the standards			EN 133200
Degree of protection			IP 21 and IP 41 in upper section
Maximum relative humidity		**%**	93 without condensation and surface water accumulation conforming to IEC 60068-2-3
Ambient temperature	Operating temperature	**°C**	0 ... +50
	Transport and storage temperature	**°C**	-25 ... +70
Max. Installation height over m.s.l. without power loss		**m**	1000 (above 1000 m: decrease the current by 1% per additional 100 m)
Vibration test conforming to IEC/EN 80068-2-6			3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1 gn peak
Shock test conforming to IEC/EN 60068-2-27			15 gn for 11 ms
Maximum rated voltage	50/60 Hz, single-phase	**V**	240 + 10%
	50/60 Hz, 3-phase	**V**	240 + 10% 500 + 10% 600 + 10%

Application case, category: **EN 61800-3:2001-02; IEC 61800-3, Ed.2**	**Description**
First environment, general availability; category C1	Installation in residential area, sale e.g. through hardware shop
First environment, limited availability; category C2	Installation in residential area, sale through specialised dealer only
Second environment; category C3	Operation in industrial mains

Lexium SD3 motion control

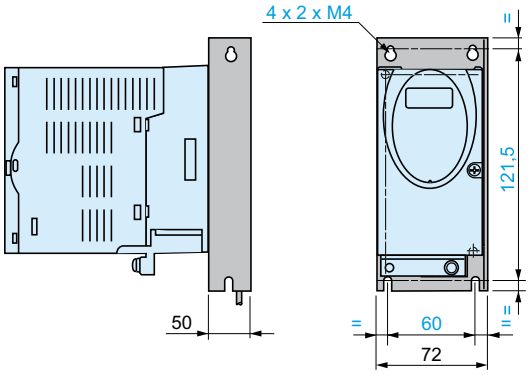
Integrated and optional additional EMC filters for stepper motor drives SD3

Reference

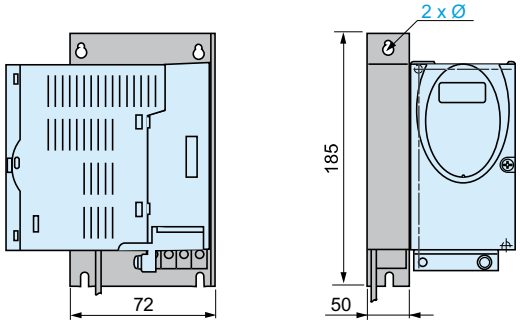
Designation	Description	Reference
EMC filter	EMC filter single-phase, 9 A, 115/230 V~	**VW3A31401**

Dimensions

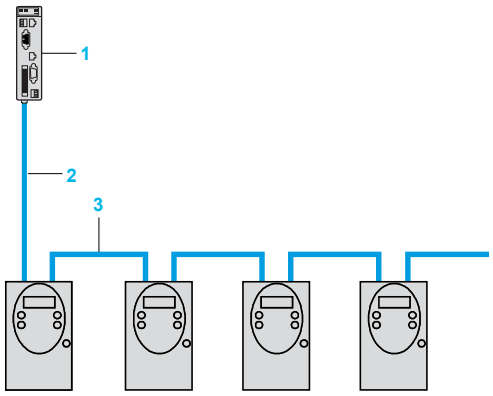
Mounting of the filter behing the stepper motor drive



Mounting of the filter next to the stepper motor drive



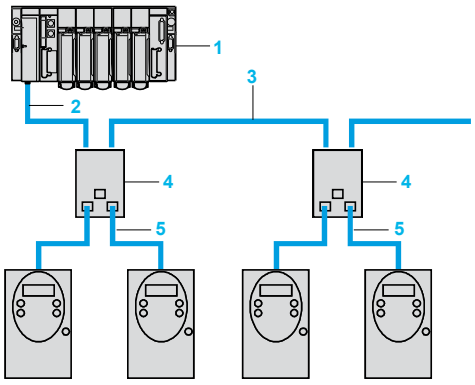
Presentation



SD328A

CANopen MotionBus connection

1 Motion controller, e.g. LMC
2 CANopen cable VW3M3805R010
3 CANopen cable TSXCAN●●



SD328A

CANopen connection with junction box

1 PLC, e.g. Twido or Premium
2 TSXCAN●● cable with SubD connector TSX CAN KCDF 90T
3 CANopen cable TSXCAN●●
4 CANopen junction box VW3CANTAP2
5 CANopen cable VW3CANCARR●●

The SD328A stepper motor drive can be connected directly to a CANopen fieldbus via two interfaces (CN1 or CN4).
Interface CN1 provides three pins as spring clamp terminals and three connections. Interface CN4 is an RJ45 connector.
A CANopen bus consists of several networked participants are interconnected via one bus cable. Every network participant must be configured before it can operate on the network. The baud rate must be the same for all devices on the fieldbus. Address and baud rate are set during commissioning.
The devices at the two ends of a bus cable must be terminated with terminating resistors. A terminating resistor is integrated in the stepper motor drive; the resistor is activated with the S1 switch.

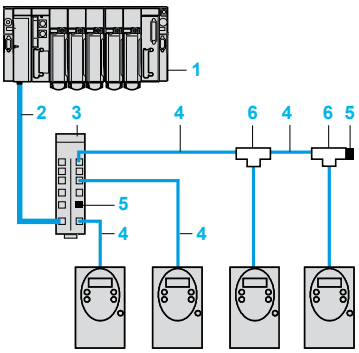
5

References

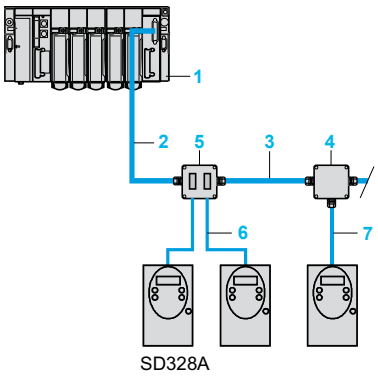
Designation	Description	Length m	Reference
CANopen cables	Both ends with 1 RJ45 connector	0.3	**VW3CANCARR03**
		1	**VW3CANCARR1**
	With 1 9-pole SubD socket with integrated terminating resistor and 1 RJ45 connector	1	**VW3M3805R010**
CANopen cables IP 20	Standard cable, CE marking, zero halogen, flame-retardant (IEC 60332-1)	50	**TSXCANCA50**
		100	**TSXCANCA100**
		300	**TSXCANCA300**
	UL-approved, CE marking, flame-retardant (IEC 60332-1)	50	**TSXCANCB50**
		100	**TSXCANCB100**
		300	**TSXCANCB300**
	For difficult environments *(1)* or portable installations, CE marking, low smoke, zero halogen, flame-retardant (IEC 60332-1)	50	**TSXCANCD50**
		100	**TSXCANCD100**
		300	**TSXCANCD300**
CANopen junction box	With 2 RJ45 ports for trunk line junction, for connection via RJ45 cable		**VW3CANTAP2**
Terminal adapter	With 3 RJ45 connectors and 1 cable	3	**TCSCTN023F13M03**
SubD connector IP 20 CANopen (Twido-end)	90° angled 9-pole SubD socket. Switch for adapting to wire end		**TSXCANKCDF90T**

(1) Difficult ambient conditions:
- Resistant to hydrocarbons, industrial oils, cleaning agents, solder splash
- Relative humidity up to 100%
- Saline environment
- High temperature variations
- Operating temperatures between -10 °C and +70 °C

Presentation



Connection via connection modules and RJ45 connectors (1)



Connection via junction boxes (1)

1 PLC
2 Modbus cable, depending on the types of control unit or PLC
3 Modbus LU9GC3 connection module
4 Modbus cable VW3A8306R●●
5 RC terminal adapter VW3A8306RC
6 Modbus T junction module VW3A8306TF●●.

1 PLC
2 Modbus cable, depending on the types of control unit or PLC
3 Modbus cable TSX CSA●●●
4 Modbus junction box TSXSCA50
5 Modbus 2-way junction box TSXSCA62
6 Modbus cable VW3A8306
7 Modbus cable VW3A8306D30

(1) Connection via screw terminals:
In this case one Modbus VW3A8306D30 cable and one RC VW3A8306DRC terminal adapter are required.

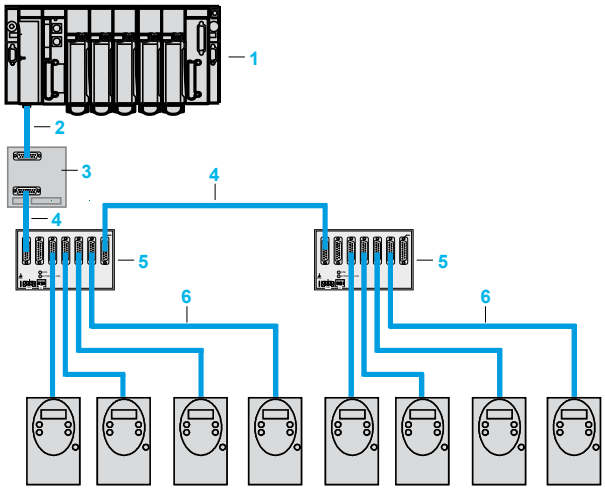
The SD328A stepper motor drive can be connected directly to a Modbus fieldbus via the CN4 interface.
In a Modbus bus, several networked participants are interconnected via one bus cable. Every network participant must be configured before it can operate on the network. Every device is assigned a unique node address.
The baud rate must be the same for all devices on the fieldbus.

References

Designation	Description		Length m	Reference
Modbus junction box	3 screw terminal strips, RC terminal adapter, for connection with VW3A8306D30 cable		–	**TSXSCA50**
Modbus 2-way junction box	2 15-pole SubD sockets, 2 screw terminal strips, RC terminal adapter, for connection with VW3A8306 cable		–	**TSXSCA62**
Modbus connection module	10 RJ45 connectors, 1 screw terminal strip			**LU9GC3**
Modbus RC terminal adapters	For RJ45 connectors	120 Ω, 1 nF	–	**VW3A8306RC**
		150 Ω	–	**VW3A8306R**
	For screw terminal strip	120 Ω, 1 nF	–	**VW3A8306DRC**
		150 Ω	–	**VW3A8306DR**
Modbus T junction modules	With integrated cable		0.3	**VW3A8 306TF03**
			1	**VW3A8306TF10**
Modbus cables	With 1 RJ45 connector, 1 end stripped, for Modbus junction box TSXSCA50		3	**VW3A8306D30**
	With 1 RJ45 connector, 1 15-pole SubD connector, for Modbus 2-way junction box TSXSCA62		3	**VW3A8306**
	2 RJ45 connectors		0.3	**VW3A8306R03**
			1	**VW3A8306R10**
			3	**VW3A8306R30**
	4-wire, shielded and twisted, RS 485, without connector		100	**TSXCSA100**
			200	**TSXCSA200**
			500	**TSXCSA500**

Lexium SD3 motion control
Pulse/direction interface for stepper motor drives SD328

Presentation



1 PLC
2 Connection cable VW3M8210R●●
3 RS 422 interface adapter USIC VW3M3102
4 Cascading cable VW3M8211R05
5 Reference value adapter VW3M3101
6 Connection cable VW3M8209R●●

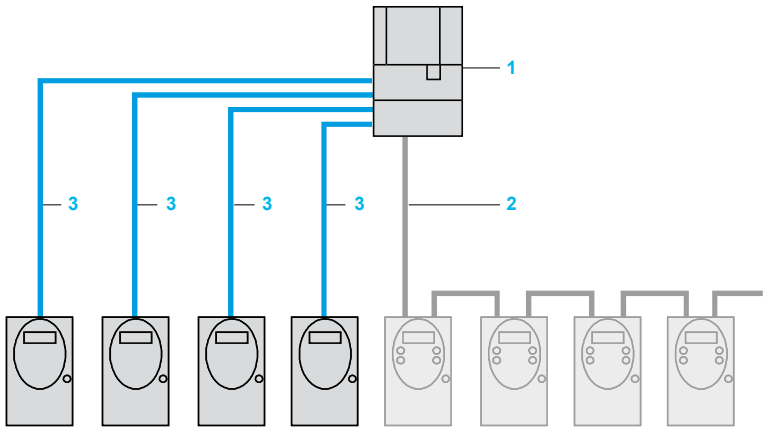
The SD328 stepper motor drives can be externally supplied with reference values in the form of pulse/direction signals. This is required for the "Electronic Gear" operating mode. In this case, the CN5 pulse/direction interface is used for supplying the reference signals (pulse/direction) or A/B encoder signals.

5

References

Designation	Description	Length m	Reference
Reference value adapter	For distribution of A/B encoder signals or pulse/direction signals to 5 devices with 24 V⎓ power supply unit for 5 V⎓ encoder power supply; for mounting to DIN rail		**VW3M3101**
Cascading cable	For reference value adapter RVA VW3M3101; with 2 15-pole SubD15 sockets	0.5	**VW3M8211R05**
RS 422 interface adapter USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard		**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket,other cable end open	0.5	**VW3M8210R05**
		1.5	**VW3M8210R15**
		3	**VW3M8210R30**
		5	**VW3M8210R50**
Cables for pulse/direction, ESIM, A/B	Device end with 10-pole Molex connector, other cable end open	0.5	**VW3M8201R05**
		1.5	**VW3M8201R15**
		3	**VW3M8201R30**
		5	**VW3M8201R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 10-pole Molex plug, CFY end with 15-pole SubD connector	0.5	**VW3M8204R05**
		1.5	**VW3M8204R15**
		3	**VW3M8204R30**
		5	**VW3M8204R50**
Pulse/direction connection cable to Siemens programmable controller S5 IP247	Device end with 10-pole Molex connector, IP247 end with SubD9 connector	3	**VW3M8205R30**
Pulse/direction connection cable to Siemens programmable controller S5 IP267	Device end with 10-pole Molex connector, IP267 end with SubD9 connector	3	**VW3M8206R30**
Pulse/direction connection cable to Siemens programmable controller S7-300 FM353	Device end with 10-pole Molex connector, FM353 end with SubD15 connector	3	**VW3M8207R30**
Pulse/direction connection cables, A/B to reference value adapter, USIC	Device end with 10-pole Molex connector, other cable end with SubD15 socket	0.5	**VW3M8209R05**
		1.5	**VW3M8209R15**
		3	**VW3M8209R30**
		5	**VW3M8209R50**

Presentation



1 PLC or Motion Controller
2 CANopen cable
3 Connection cable VW3S8208R●●

The CN1 signal interface of the SD326 stepper motor drive is used for supplying the reference signals (pulse/direction).

References

Designation	Description	Length m	Reference
Pulse/direction cables	5 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	**VW3S8201R05**
		1.5	**VW3S8201R15**
		3	**VW3S8201R30**
		5	**VW3S8201R50**
	24 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	**VW3S8202R05**
		1.5	**VW3S8202R15**
		3	**VW3S8202R30**
		5	**VW3S8202R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 24-pole Molex plug; CFY end with 15-pole SubD connector	1.5	**VW3S8204R15**
		3	**VW3S8204R30**
Pulse/direction connection cables to Siemens programmable controller S7-300 FM353	Device end with 24-pole Molex plug; FM353 end with SubD15 socket	1.5	**VW3S8206R15**
		3	**VW3S8206R30**
Pulse/direction connection cables to Schneider Electric motion controller TLM2	Device end with 24-pole Molex plug; other cable end with SubD15 socket	0.5	**VW3S8208R05**
		1.5	**VW3S8208R15**
		3	**VW3S8208R30**
		5	**VW3S8208R50**

Lexium SD3 motion control

Option: Remote display terminal for stepper motor drives SD328

Presentation

A remote terminal can be connected to the SD328 stepper motor drive, which can be attached to a control cabinet door with an IP 65 seal. The terminal has a display and enables access to the same functions as the control panel of the stepper motor drive (HMI).

Description

1 Display
- Four 7-segment displays
- Display of numeric values and codes
- Save values when display flashes
- Flashing display on device fault

2 ESC
- Exit a menu or parameter
- Return from currently displayed to most recently saved value

3 Red LED lights up: DC bus under voltage

4 ENT
- Display a menu or parameter
- Save the displayed value

5 Quick Stop (Software Stop)

6 Error reset (Continue)

7 No function

8 Down arrow
- Go to next menu or parameter
- Decrease the displayed value

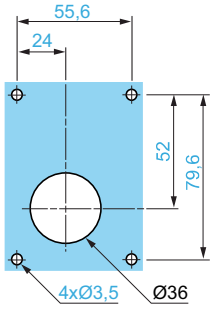
9 Up arrow
- Go to previous menu or parameter
- Increase the displayed value

5

Reference

Designation	Description	Reference
Remote terminal	Incl. cable with 2 connectors, seal and screws for mounting to control cabinet door, degree of protection IP 65	**VW3A31101**

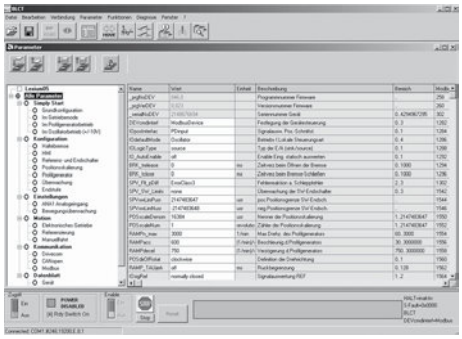
Dimensions

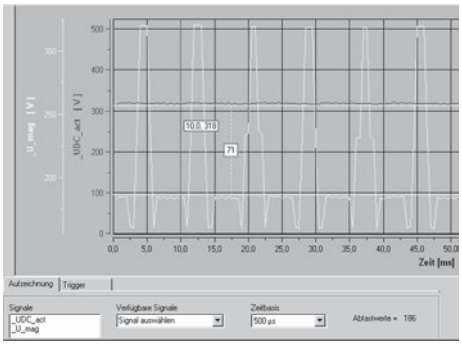


Lexium SD3 motion control

Option: “Lexium CT” commissioning software for stepper motor drives SD328

Presentation





Description

The Windows-based “Lexium CT” commissioning software is used for easy commissioning, parameterisation, simulation and diagnostics of the SD328 stepper motor drive.

As compared to the integrated control panel (HMI), the “Lexium CT” commissioning software offers additional features such as:

- Graphical user interface for parameterisation and status display
- Comprehensive diagnostics tools for optimisation and maintenance
- Long-term recording as an aid to assessing operational behaviour
- Testing input and output signals
- Tracking signal sequences on the monitor
- Archiving of all device settings and records (with export functions for data processing)

System requirements

You will need a PC or laptop with a free serial interface and MS Windows® 2000 or later

Download

The current version of the “Lexium CT” commissioning software can be downloaded from www.schneider-electric.com.

Connection accessory

Designation	Length m	Reference
RJ45 programming cable with RS 485/RS 232 adapter	3	**VW3A8106**

5

Lexium SD3 motion control

Accessory: Mounting plate for stepper motor drives SD3

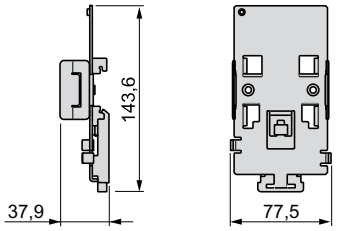
Presentation

The mounting plate is used for mounting the SD3 to a DIN rail.

Reference

Designation	Description	Reference
Mounting plate	For mounting to DIN rail	**VW3A11851**

Dimensions



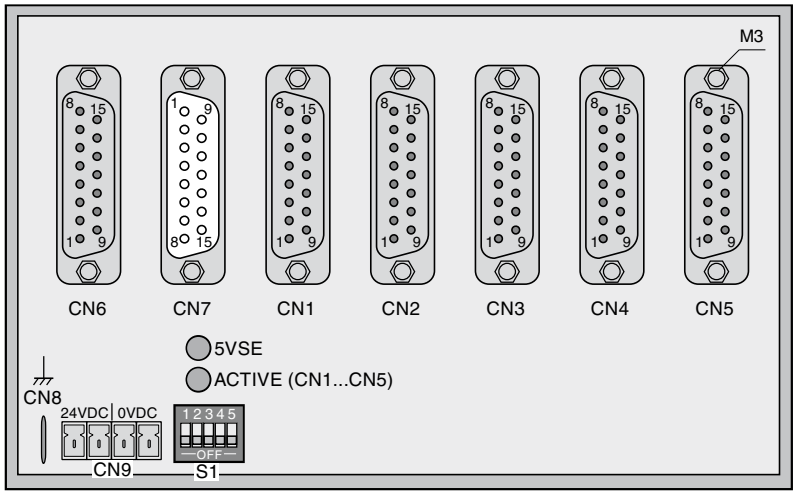
Lexium SD3 motion control
Option: Reference value adapter (RVA) for stepper motor drives SD328

Presentation

Reference signals from a master can be sent simultaneously to up to five devices using the RVA (Reference Value Adapter). This adapter also provides the supply voltage (5V, monitored with SENSE lines) for the encoder. Correct power supply is indicated by a “5VSE” LED.
An external encoder (A/B signals) or an encoder simulation (ESIM) can be used as a master. Pulse/direction signals can also be sent from a master controller.

The RVA reference value adapter is supplied with 24 V via the CN9 connections. A master controller (pulse/direction) can be connected to CN6. An external encoder or an ESIM signal can be supplied via CN7.

Connections



Reference value adapter RVA, connections

Characteristics

Dimensions (W x H x D)	**mm**	77 x 135 x 37
Input		
Supply voltage	**V⎓**	19.2 ... 30
Current consumption	**mA**	15 ... 150
5VSE no load	**mA**	50
5VSE 300 mA	**mA**	150
Output, encoder		Sense-controlled, short-circuit-proof, overload-proof
5VSE	**V⎓**	4.75 ... 5.25
Max. output current	**mA**	300

References

Designation	Description	Length m	Reference
Reference value adapter	For distribution of A/B encoder signals or pulse/direction signals to 5 devices with 24 V⎓ power supply unit for 5 V⎓ encoder power supply; for mounting to DIN rail	–	**VW3M3101**
Cascading cable	For reference value adapter VW3M3101	0.5	**VW3M8211R05**

Lexium SD3 motion control
Option: RS 422 interface adapter (USIC) for stepper motor drives SD328

Presentation

RS 422 interface adapter USIC

The USIC (Universal Signal Interface Converter) is an interface adapter which is used for universal adaptation of pulse/direction interface to a master controller (e.g. PLC).
A USIC is recommended in the following cases:
- If 24 V signals are to be connected to 5 V signal inputs.
- If the signals must be galvanically isolated (e.g. incorrect reference potential, strong interference in environment).
- If signals with an open collector are connected over distances greater than 3 m or if the frequency is greater than 50 kHz.

The USIC has the following features:
- 24 V or 5 V signal inputs (optocoupler) are available as required.
- Control signals are adapted for products with inputs according to RS 422.
- Galvanic isolation of signals

Note: *A power supply (24 V corresponding to PELV) must be provided by the customer.*

Characteristics

Dimensions (W x H x D)		**mm**	77 x 135 x 37
Degree of protection conforming to EN 60529			IP 00
Supply voltage		**V**	⎓ 20 ... 30
Current consumption		**A**	15 ... 150
Residual ripple		**V_{ss}**	< 2
Signal inputs			Opto-isolated, protected against reverse polarity
Resistance network, plugged			75 Ω, factory standard
	Level		5 V level (U_S: 2.5 ... 5.25 V)
	Max. input voltage	**V**	5.25
	Turn-on voltage U_E	**V**	2.5
	Turn-off voltage U_A	**V**	0.4
	Typical input current at nominal voltage	**mA**	10
Resistance network	Level		24∀ level (U_S: 20 ... 30 V)
	Max. input voltage	**V**	30
	Turn-on voltage U_E	**V**	20
	Turn-off voltage U_A	**mA**	3
	Typical input current at nominal voltage		10
Signal outputs			Open collector outputs, short-circuit protected
Open collector outputs			Short-circuit protected
	Max. output voltage	**V**	30
	Max. output current	**mA**	50
RS 422 signal outputs			Short-circuit protected
Ambient conditions			
Operating temperature *(1)*		**°C**	0 ... +50
Transport and storage temperature		**°C**	-25 ... +70
Pollution degree			Step 2
Rel. humidity conforming to IEC 60721-3-3, class 3K3		**%**	5 ... 85%, no condensation allowed
Vibration test conforming to IEC/EN 60068-2-6			3 ... 13 Hz: 1.5 mm peak 13 ... 150 Hz: 1 gn peak
Shock test conforming to IEC/EN 60068-2-27			15 gn for 11 ms

(1) No icing

References

Designation	Description	Length m	Reference
USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard	–	**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket, other cable end open	0.5	**VW3M8210R05**
		1.5	**VW3M8210R15**
		3	**VW3M8210R30**
		5	**VW3M8210R50**

Lexium SD3 motion control
Option: GBX planetary gearboxes

Presentation

GBX planetary gearbox

In many cases the axis controller requires the use of a planetary gearbox for adjustment of speed of rotation and torque; the accuracy required by the application must be maintained.

To meet these requirements, Schneider Electric has decided to use the Neugart GBX planetary gears which are specially tuned to the BRS stepper motors. This planetary gearbox features lifetime lubrication. GBX planetary gears are easy to install and operate.

The planetary gears are – depending on the power of the stepper motors – available in four sizes (GBX 60 ... GBX160) and with ten gear ratios (3:1 ... 25:1) (see table below).

The values for the continuous torque and the peak torque at standstill available at the output shaft are calculated by multiplying the characteristic values of the motor by the gear ratio and the efficiency of the gearing (0.96 or 0.94 depending on the gear ratio).

The following table shows the optimum combination of BRS stepper motor and GBX planetary gearbox.

BRS stepper motor and GBX planetary gearbox combinations

Stepper motor *(1)*	Reduction ratio									
	3:1	4:1	5:1	8:1	9:1	12:1	15:1	16:1	20:1	25:1
BRS368W13 (W = 8 mm, Z = 38 mm)	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60	GBX 60
BRS397W36 (W = 12 mm, Z = 60 mm)	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRS39AW36 (W = 12 mm, Z = 60 mm)	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRS39BW46 (W = 14 mm, Z = 60 mm)	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80	GBX 80
BRS3ACW85 (W = 19 mm, Z = 56 mm)	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120
BRS3ADW85 (W = 19 mm, Z = 56 mm)	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 120	GBX 160

(1) GBX planetary gearboxes can be mounted to stepper motors with the specified shaft version (W) and the specified centring collar (Z).

GBX 80 *For these combinations, you must check that the application will not exceed the maximum output torque of the gearbox, see page 5/64.*

Lexium SD3 motion control
Option: GBX planetary gearboxes

Characteristics

Type of gearbox			GBX 60	GBX 80	GBX 120	GBX 160
Version			Planetary gearbox with straight teeth			
Backlash	3:1 ... 8:1	**arcmin**	< 16	< 9	< 8	< 6
	9:1 ... 25:1		< 20	< 14	< 12	< 10
Torsional rigidity	3:1 ... 8:1	**Nm/ arcmin**	2.3	6	12	38
	9:1 ... 25:1		2.5	6.5	13	41
Noise level *(1)*		**dB(A)**	58	60	65	70
Casing			Black anodized aluminium			
Shaft material			C 45			
Shaft output dust and damp protection			IP 54			
Lubrication			Lubricated life			
Average service life *(2)*		**h**	30,000			
Mounting position			Any position			
Operating temperature		**°C**	-25 ... +90			
Efficiency	3:1 ... 8:1		0.96			
	9:1 ... 25:1		0.94			
Maximum permitted radial force *(2) (3)*	L_{10h} = 10,000 h	**N**	500	950	2000	6000
	L_{10h} = 30,000 h	**N**	340	650	1500	4200
Maximum permitted axial force *(2)*	L_{10h} = 10,000 h	**N**	600	1200	2800	8000
	L_{10h} = 30,000 h	**N**	450	900	2100	6000
Moment of inertia of gearbox	3:1	**kgcm²**	0.135	0.77	2.63	12.14
	4:1	**kgcm²**	0.093	0.52	1.79	7.78
	5:1	**kgcm²**	0.078	0.45	1.53	6.07
	8:1	**kgcm²**	0.065	0.39	1.32	4.63
	9:1	**kgcm²**	0.131	0.74	2.62	–
	12:1	**kgcm²**	0.127	0.72	2.56	12.37
	15:1	**kgcm²**	0.077	0.71	2.53	12.35
	16:1	**kgcm²**	0.088	0.50	1.75	7.47
	20:1	**kgcm²**	0.075	0.44	1.50	6.65
	25:1	**kgcm²**	0.075	0.44	1.49	5.81
Continuous output torque *(2)*	3:1	**Nm**	28	85	115	400
	4:1	**Nm**	38	115	155	450
	5:1	**Nm**	40	110	195	450
	8:1	**Nm**	18	50	120	450
	9:1	**Nm**	44	130	210	–
	12:1	**Nm**	44	120	260	800
	15:1	**Nm**	44	110	230	700
	16:1	**Nm**	44	120	260	800
	20:1	**Nm**	44	120	260	800
	25:1	**Nm**	40	110	230	700
Maxium output torque *(2)*	3:1	**Nm**	45	136	184	640
	4:1	**Nm**	61	184	248	720
	5:1	**Nm**	64	176	312	720
	8:1	**Nm**	29	80	192	720
	9:1	**Nm**	70	208	336	–
	12:1	**Nm**	70	192	416	1280
	15:1	**Nm**	70	176	368	1120
	16:1	**Nm**	70	192	416	1280
	20:1	**Nm**	70	192	416	1280
	25:1	**Nm**	64	176	368	1120

(1) Value measured at a distance of 1 m, at no-load for a servo motor speed of 3000 rpm and a reduction ratio of 5:1.
(2) Values given for an output shaft speed of 100 rpm in S1 mode (cyclic ratio = 1) on electrical machines for an ambient temperature of 30 °C.
(3) Force applied at mid-distance from the output shaft.

References

GBX planetary gearbox

Size	Reduction ratio	Reference *(1)*	Weight kg
GBX 60	3:1... 8:1	**GBX 060 ●●● ●●● ●S**	0.900
	9:1 ... 25:1	**GBX 060 ●●● ●●● ●S**	1.100
GBX 80	3:1... 8:1	**GBX 080 ●●● ●●● ●S**	2.100
	9:1 ... 25:1	**GBX 080 ●●● ●●● ●S**	2.600
GBX 120	3:1... 8:1	**GBX 120 ●●● ●●● ●S**	6.000
	9:1 ... 25:1	**GBX 120 ●●● ●●● ●S**	8.000
GBX 160	25:1	**GBX 160 ●●● ●●● ●S**	22.000

(1) To order a GBX planetary gearbox, complete each reference above with:

		GBX	●●●	●●●	●●●	●	S
Size	Diameter of casing *(2)*	60 mm	**060**				
		80 mm	**080**				
		120 mm	**120**				
		160 mm	**160**				
Reduction ratio		3:1		**003**			
		4:1		**004**			
		5:1		**005**			
		8:1		**008**			
		9:1		**009**			
		12:1		**012**			
		15:1		**015**			
		16:1		**016**			
		20:1		**020**			
		25:1		**025**			
Associated stepper motor	Type	BRS36●			**060**		
		BRS39●			**090**		
		BRS3A●			**110**		
	Model	BRS368				**1**	
		BRS397				**2**	
		BRS39A, BRS39B				**3**	
		BRS3AC, BRS3AD				**4**	
BRS stepper motor adaptation							**S**

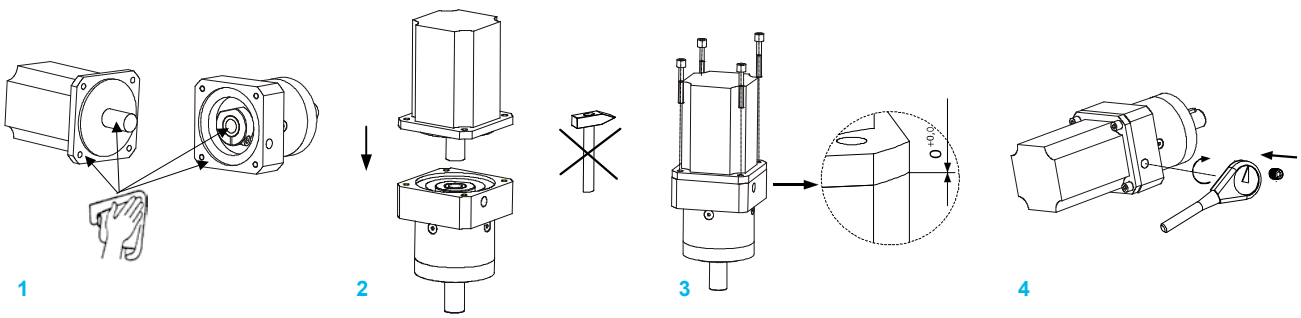
(2) See table of combinations with BRS stepper motor on page 5/63.

Mounting recommendations

Special tools are not required for mounting the GBX planetary gearbox to the motor. Note the following requirements:

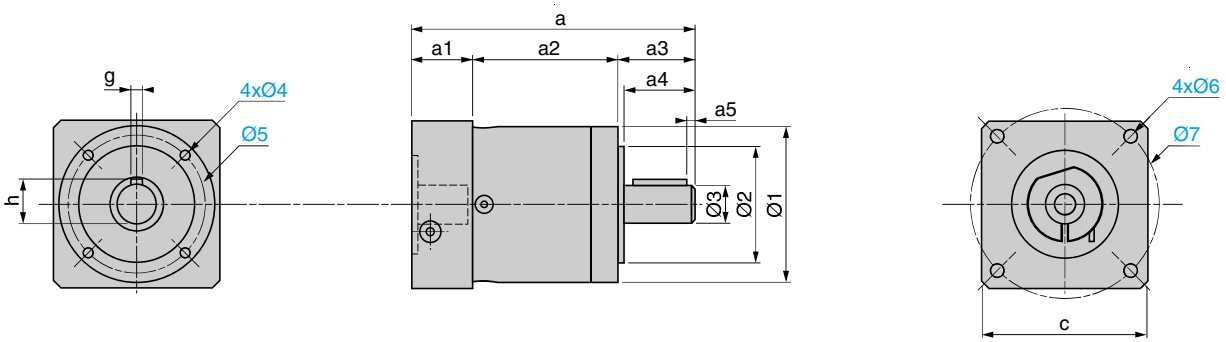
1 Clean grease off contact surfaces and seals.
2 If possible, mount the motor in a vertical position. Fit motor into gearing.
3 Motor flange must be in contact with gearing flange. Tighten screws crosswise.
4 Tighten clamping ring with torque spanner.

More information can be found in the user's manual supplied with the product.



Dimensions

Mounting at motor side



GBX	c	A	a1	a2	a3	a4	a5	h	g	Ø1	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
060 003 ... 008	60	106.5	24.5	47	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52	M5 x 12	63
060 009 ... 025	60	118.5	24.5	59	35	30	2.5	16	5	60	40 h7	14 h7	M5 x 8	52	M5 x 12	63
080 003 ... 008	90	134	33.5	60.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70	M6 x 15	100
080 009 ... 025	90	151	33.5	77.5	40	36	4	22.5	6	80	60 h7	20 h7	M6 x 10	70	M6 x 15	100
120 003 ... 008	115	176.5	47.5	74	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100	M8 x 20	115
120 009 ... 025	115	203.5	47.5	101	55	50	5	28	8	115	80 h7	25 h7	M10 x 16	100	M8 x 20	115
160 025	140	305	64.5	153.5	87	80	8	43	12	160	130 h7	40 h7	M12 x 20	145	M10 x 25	165

Lexium SD3 motion control
Options and accessories
Overview

Designation	Description	Length	For SD3			Reference
			26	28 A	28B	
		m				
EMC filter	EMC filter single-phase, 9 A, 115/230 V_{AC}		x	x	x	**VW3A31401**
CANopen machine bus						
CANopen cables	Both ends with 1 RJ45 connector	0.3		x		**VW3CANCARR03**
		1		x		**VW3CANCARR1**
CANopen cable	With 1 9-pole SubD socket with integrated terminating resistor and 1 RJ45 connector	1		x		**VW3M3805R010**
CANopen cables IP 20	Standard cable, CE marking, zero halogen, flame-retardant (IEC 60332-1)	50		x		**TSXCANCA50**
		100		x		**TSXCANCA100**
		300		x		**TSXCANCA300**
	UL-approved, CE marking, flame-retardant (IEC 60332-1)	50		x		**TSXCANCB50**
		100		x		**TSXCANCB100**
		300		x		**TSXCANCB300**
	For difficult ambient conditions *(1)* or portable installations, CE marking, low smoke, zero halogen, flame-retardant (IEC 60332-1)	50		x		**TSXCANCD50**
		100		x		**TSXCANCD100**
		300		x		**TSXCANCD300**
CANopen junction box	With 2 RJ45 ports for trunk line junction, for connection via RJ45 cable	–		x		**VW3CANTAP2**
Terminal adapter	With 3 RJ45 connectors and 1 cable	0.3		x		**TCSCTN023F13M03**
SubD connector IP 20 CANopen (Twido-end)	90° angled 9-pole SubD socket. Switch for adapting to wire end	–		x		**TSXCANKCDF90T**
Modbus serial link						
Modbus junction box	3 screw terminal strips, RC terminal adapter, for connection with VW3A8306D30 cable	–		x		**TSXSCA50**
Modbus 2-way junction box	2 15-pole SubD sockets, 2 screw terminal strips, RC terminal adapter, for connection with VW3A8306 cable	–		x		**TSXSCA62**
Modbus connection module	10 RJ45 connectors, 1 screw terminal strip	–		x		**LU9GC3**
Modbus RC terminal adapters	For RJ45 connectors 120 Ω, 1 nF	–		x		**VW3A8306RC**
	For RJ45 connectors 150 Ω	–		x		**VW3A8306R**
	For screw terminal strip 120 Ω, 1 nF	–		x		**VW3A8306DRC**
	For screw terminal strip 150 Ω	–		x		**VW3A8306DR**
Modbus T junction modules	With integrated cable	0.3		x		**VW3A8306TF03**
		1		x		**VW3A8306TF10**
Modbus cables	With 1 RJ45 connector, 1 end stripped, for Modbus junction box TSXSCA50	3		x		**VW3A8306D30**
	With 1 RJ45 connector, 1 15-pole SubD connector, for Modbus 2-way junction box TSXSCA62	3		x		**VW3A8306**
	2 RJ45 connectors	0.3		x		**VW3A8306R03**
		1		x		**VW3A8306R10**
		3		x		**VW3A8306R30**
	4-wire, shielded and twisted, RS 485, without connector	100		x		**TSXCSA100**
		200		x		**TSXCSA200**
		500		x		**TSXCSA500**

(1) Difficult ambient conditions:
- *Resistant to hydrocarbons, industrial oils, cleaning agents, solder splash*
- *Relative humidity up to 100%*
- *Saline environment*
- *High temperature variations*
- *Operating temperatures between -10 °C and +70 °C*

Lexium SD3 motion control
Options and accessories
Overview

Designation	Description	Length	For SD3			Reference
			26	28 A	28B	
		m				
Pulse/direction interface						
Reference value adapter	For distribution of A/B encoder signals or pulse direction signals to 5 devices with 24 VDC power supply unit for 5 VDC encoder power supply; for mounting to DIN rail	–		x	x	**VW3M3101**
Cascading cable	For reference value adapter VW3M3101	0.5		x	x	**VW3M8211R05**
RS 422 interface adapter USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard	–		x	x	**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket,other cable end open	0.5		x	x	**VW3M8210R05**
		1.5		x	x	**VW3M8210R15**
		3		x	x	**VW3M8210R30**
		5		x	x	**VW3M8210R50**
Cables for pulse/direction, ESIM, A/B	Device end with 10-pole Molex connector, other cable end open	0.5		x	x	**VW3M8201R05**
		1.5		x	x	**VW3M8201R15**
		3		x	x	**VW3M8201R30**
		5		x	x	**VW3M8201R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 10-pole Molex connector, CFY end with 15-pole SubD connector	0.5		x	x	**VW3M8204R05**
		1.5		x	x	**VW3M8204R15**
		3		x	x	**VW3M8204R30**
		5		x	x	**VW3M8204R50**
Pulse/direction connection cable to Siemens programmable controller S5 IP247	Device end with 10-pole Molex connector, IP247 end with SubD9 connector	3		x	x	**VW3M8205R30**
Pulse/direction connection cable to Siemens programmable controller S5 IP267	Device end with 10-pole Molex connector, IP267 end with SubD9 connector	3		x	x	**VW3M8206R30**
Pulse/direction connection cable to Siemens programmable controller S7-300 FM353	Device end with 10-pole Molex connector, FM353 end with SubD15 connector	3		x	x	**VW3M8207R30**
Pulse/direction connection cables, A/B to reference value adapter, USIC or TLM2	Device end with 10-pole Molex connector, other cable end with SubD15 socket	0.5		x	x	**VW3M8209R05**
		1.5		x	x	**VW3M8209R15**
		3		x	x	**VW3M8209R30**
		5		x	x	**VW3M8209R50**
Signal interface						
Pulse/direction cables	5 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	x			**VW3S8201R05**
		1.5	x			**VW3S8201R15**
		3	x			**VW3S8201R30**
		5	x			**VW3S8201R50**
	24 V, shielded; Device end with 24-pole Molex plug; other cable end open	0.5	x			**VW3S8202R05**
		1.5	x			**VW3S8202R15**
		3	x			**VW3S8202R30**
		5	x			**VW3S8202R50**
Pulse/direction connection cables to Schneider Electric Premium motion control modules TSX CFY	Device end with 24-pole Molex plug; CFY end with 15-pole SubD connector	1.5	x			**VW3S8204R15**
		3.0	x			**VW3S8204R30**
Pulse/direction connection cables to Siemens programmable controller S7-300 FM353	Device end with 24-pole Molex plug; FM353 end with SubD15 socket	1.5	x			**VW3S8206R15**
		3	x			**VW3S8206R30**
Pulse/direction connection cables on Schneider Electric motion controller TLM2	Device end with 24-pole Molex plug; other cable end with SubD15 socket	0.5	x			**VW3S8208R05**
		1.5	x			**VW3S8208R15**
		3	x			**VW3S8208R30**
		5	x			**VW3S8208R50**
Motor cables						
Cables for 3-phase stepper motor	4 x 1.5 mm², shielded; motor end with 6-pole circular connector; other cable end open	3	x	x	x	**VW3S5101R30**
		5	x	x	x	**VW3S5101R50**
		10	x	x	x	**VW3S5101R100**
		15	x	x	x	**VW3S5101R150**
		20	x	x	x	**VW3S5101R200**
Encoder cables						
Encoder cables	Configured for stepper motor; shielded; motor end with 12-pole encoder plug; device end with 12-pole Molex plug	3	x	x	x	**VW3S8101R30**
		5	x	x	x	**VW3S8101R50**
		10	x	x	x	**VW3S8101R100**
		15	x	x	x	**VW3S8101R150**
		20	x	x	x	**VW3S8101R200**

Designation	Description	Length	For SD3			Reference
			26	28 A	28B	
		m				
Programming cable						
RJ45 programming cable with RS 485/RS 232 adapter		3		x	x	**VW3A8106**
Reference value adapter RVA						
Reference value adapter RVA	For distribution of A/B encoder signals or pulse/direction signals to 5 devices with 24 VDC power supply unit for 5 VDC encoder power supply; for mounting to DIN rail	–		x	x	**VW3M3101**
Cascading cable	For reference value adapter VW3M3101	0.5		x	x	**VW3M8211R05**
RS 422 interface adapter USIC						
RS 422 interface adapter USIC (Universal Signal Interface Converter)	For adaptation of control signals to RS 422 standard	–		x	x	**VW3M3102**
Pulse/direction connection cables for connecting a PLC to USIC	Shielded; USIC end with SubD15 socket,other cable end open	0.5		x	x	**VW3M8210R05**
		1.5		x	x	**VW3M8210R15**
		3		x	x	**VW3M8210R30**
		5		x	x	**VW3M8210R50**
Other accessories						
Remote terminal	Incl. cable with 2 connectors, seal and screws for mounting to control cabinet door, degree of protection IP 65	–		x	x	**VW3A31101**
Mounting plate	For mounting to DIN rail	–	x	x	x	**VW3A11851**
Connector kit	With 5 24-pole Molex plugs; with crimp contacts	–	x	x	x	**VW3S8212**
	With 5 12-pole Molex plugs; with crimp contacts	–	x	x	x	**VW3S8213**
	With 5 10-pole Molex plugs; with crimp contacts	–	x	x	x	**VW3S8214**
Fan kit	Fan kit 24 ⎓ V	–	x	x	x	**VW3S3101**
Technical documentation	CD-ROM, multilingual; Contents: ■ Technical documentation, multilingual ■ Lexium CT commissioning software ■ EPlan macros ■ CAD drawings ■ EDS and GSD files	–	x	x	x	**VW3M8703**